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AN EXPLORATORY STUDY OF PREDICTORS OF PHYSICIAN PERFORMANCE.

BY- JACOBSEN, TONY L. AND OTHERS
UTAH UNIV., SALT LAKE CITY

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AN ATTEMPT WAS MADE TO DETERMINE THE PREDICTIVE ACCURACY OF THREE MEDICAL SCHOOL SELECTION DEVICES--PREMEDICAL GRADES, THE MEDICAL COLLEGE ADMISSION TEST (MCAT), AND THE BIOGRAPHICAL INVENTORY FOR MEDICINE (BIM). THE BIM REPRESENTS A NEWLY DEVISED SELECTION INSTRUMENT FOR THE MEDICAL SCHOOL. IN THE STUDY, EACH INSTRUMENT WAS VALIDATED AGAINST IMMEDIATE CRITERIA OF MEDICAL SCHOOL PERFORMANCES AND THE MORE ULTIMATE CRITERIA OF ON-THE-JOB PERFORMANCES. THE MORE ULTIMATE CRITERIA MEASURES EMPLOYED WERE THE RESULTS OF AN EXTENSIVE YEAR-AND-A-HALF STUDY OF ABOUT 800 PRACTICING PHYSICIANS REPRESENTING THREE MAJOR AREAS OF MEDICAL PRACTICE--GENERAL PRACTICE, SPECIALITY PRACTICE, AND MEDICAL SCHOOL FACULTY "PRACTICE." A TOTAL OF 30 FACTOR SCORES (CRITERIA MEASURES) HAD BEEN CALCULATED FROM THE PREVIOUS STUDY. THE STUDY DEMONSTRATED THAT NO SINGLE PREDICTIVE DEVICE NOW IN USE CAN MEET THE STRINGENT REQUIREMENTS OF PREDICTING THE MULTIFACETED DIMENSIONS WHICH COMPRISE TOTAL PHYSICIAN PERFORMANCE. THE INVESTIGATORS RECOMMEND REFINEMENT AND EXTENSION OF BOTH THE CRITERIA AND PREDICTORS. (JC)

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An Exploratory Study of Predictors of Physician Performance

Tony L. Jacobsen, Philip B. Price,
Gary H. de Mik, and Calvin W. Taylor

University of Utah

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Tony L. Jacobsen, Philip B. Price
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Principal Investigator: Philip B. Price

College of Medicine and Department of Psychology
University of Utah
Salt Lake City, Utah

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*Other key members on this project team were Ted Yellen, Mike Tucker, Evan Lewis, Barbara Mortensen, Connie Jensen, and the 754 physicians who so willingly cooperated in this project.

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Chapter I

Introduction

The goal of professional medical education, briefly summarized, is that of training students in such a manner that they will perform at least creditably in professional practice. In attempting to achieve this goal medical schools have traditionally assumed that in order to profit from their training programs students must possess a minimal level of certain necessary intellectual and character traits and ethical values. As a consequence, our medical schools have established relatively standardized admission procedures for identifying and selecting students who will successfully complete their training and eventually perform well in medical practice. But by relying upon these selection programs, medical educators have committed themselves--whether they have been fully aware of it or not--to letting the selection programs define the characteristics student applicants must possess to be accepted into their training programs. Unfortunately, even a cursory review of the literature on medical school selection programs indicates that they have not been subjected to continuous and systematic evaluation and they have not demonstrated a high level of validity either in predicting performance in medical school or later, on-the-job performance as a practicing physician.

With few exceptions, three lines of evidence have been most heavily relied upon in evaluating and selecting applicants for medical school training: premedical scholastic achievement as indicated by grades, achievement test scores, and premedical faculty ratings, performance on the Medical College Admission Test, and appraisals drawn in personal interviews by one or more members of a college of medicine faculty. Typically, quantitative ratings are assigned to each of these factors which are then considered by an admissions committee in eventually deciding whether to accept or reject a given applicant. Overall, none of these sources of information has held up in terms of predicting medical school achievement, and, most crucially, they have rarely been evaluated in terms of predictive validity for on-the-job, professional performance.

Premedical Grade-Point-Average (GPA). Of the selection devices currently employed in our medical schools, grade-point-averages are unparalleled in being a focus of attention. No single measurement weighs so heavily as the premedical GPA in determining who is and who is not encouraged to enter our medical schools. A few years ago, Gottheil and Miller (1957) surveyed the literature and reported that the mean validity coefficient of premedical GPA's for predicting overall medical school achievement was greater than .50. This level of correlation was, of course, very encouraging to the medical educator.[1]

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[1] In addition, correlations of this magnitude are expected to increase even more when corrections for restriction of range are applied. However, when they drop to near-zero magnitudes such does not occur. When they fall to these low levels restriction of range correction formulas will not appreciably change them even if one assumes drastic effects of restricted talent (see Price, Taylor, Richards, & Jacobsen (1963) for a lengthy discussion of the restriction of range argument in relation to these problems).

However, more recent and extensive studies tend to show that these findings were prematurely encouraging, especially in terms of performance beyond the two years of medical school. Specifically, a mounting body of more recent evidence suggests that premedical GPA's show some promise, but not of the magnitude reported by Gottheil and Miller, for predicting achievement in the first two years of medical school, and thereafter gradually diminish in predictive validity. In other words, the premedical GPA seems to yield diminishing returns as one progresses from medical school, to internship and residency, and finally to actual performance as a practicing physician. In general, it seems the more dissimilar later performances are to premedical academic work the lower the relationships.

As mentioned above, premedical GPA's appear to have some validity in forecasting medical school achievement, as measured by the GPA. Hill (1959), for example, observed consistently significant relationships between premedical GPA's and first-year medical school GPA's in his review. In a study by Schwartzman, Hunter and Lohrenz (1962) grades in five premedical subjects (English, physics, chemistry, organic chemistry, and biology) were correlated with grades in each of the four years of medical school. They found that grades in each of the five premedical subjects was significantly related to first-year medical school grades, four were related to second-year grades, three to third-year grades, and none to fourth-year grades. Similarly, Gaier (1952) studied two medical school classes at the State University of Iowa and found in the first class (N=66) premedical GPA's correlated .45, .32, .35, and .43 with GPA's for each of the four years of medical training, and in the second class (N=74) the same relationships yielded correlations of .37, .44, .43, and .20, respectively.

Overall, the above studies seem to support the use of premedical GPA's in predicting medical school achievement. However, when the composite picture is viewed we note a sudden drop in the predictive validity of premedical GPA's. For instance, against overall medical GPA Hammond and Kern (1959) report a coefficient of .29. At Michigan, the same authors found the median coefficient for premedical GPA's against a five-factor criteria at graduation to be .18. In a study of 102 members of the full-time faculty of the University of Utah College of Medicine (Price, Taylor, Richards, & Jacobsen, 1963) it was found that their premedical GPA's correlated .28 with overall medical school GPA. The evidence from other studies suggest that this sudden drop in validity is due to the last years of medical school training. Gough, Hall, and Harris (1963) in their survey of fourteen successive classes of the University of California School of Medicine found that premedical GPA's correlated .22 with first-year grades, .22 with second-year grades, .16 with third-year grades, and .07 with fourth-year grades. Similarly, Richards, Taylor, Price, and Jacobsen (1964) studied 190 practicing certified medical specialists and discovered a correlation of .16 between their premedical GPA and their GPA for the first two years of medical school as opposed to a correlation of only .08 for their last two years of medical school. Comparable results have been found by Richards and Taylor (1961) in their study of 139 interns of the University of Utah's College of Medicine. Finally, Gough, Hall, and Harris (1963) correlated premedical GPA's with faculty ratings of graduating medical students on clinical judgment, diagnostic skill, and identification with medicine and observed consistent zero-order relationships ranging from -.07 to .05.

Turning now to research in which a later more intermediate predictive criterion than medical grades has been used in validating premedical grades, we find first that only a single study has been reported and second that it showed even more disappointing results. Specifically in 1961 Richards, Taylor, and Price (1962) obtained several internship ratings on 139 University of Utah Medical School graduates, representing the graduating classes of 1955-1958. The obtained mean validity coefficient between premedical grades and these internship ratings was .03. Although this finding is limited in that it has not been confirmed by other independent researchers, it certainly fits the apparent trend of premedical grades losing their predictive validity as one moves away from the stereotyped academic setting of the first medical school years to the clinical years, to the internship and residency years, and finally to the years of actual on-the-job performance. Of course, other studies of the internship and residency period are needed, particularly the period of residency which apparently has not been investigated.

Although both immediate criteria, such as medical school GPA's, and intermediate criteria, such as internship and residency ratings, are important considerations in empirically testing the validity of premedical grades as a selection tool, the most critical test of their forecasting ability is against the more ultimate criteria of quality of performance as a practicing physician. However, as with the internship and residency period we find only three studies, all by the same authors, in which measures of on-the-job performance have been employed in assessing the predictive validity of premedical grades (Price, Taylor, & Jacobsen, 1963). In each of the studies premedical GPA, GPA for the first two years of medical school and GPA for the last two years of medical school were correlated against 77 measures of on-the-job physician performance. In the first, 102 full-time faculty members of the College of Medicine of the University of Utah were studied (Taylor, Price, Richards, & Jacobsen, 1965); in the second, 190 certified Utah specialists (Richards, Taylor, Price, & Jacobsen, 1964); and in the third, 217 general practitioners (Price, Taylor, Richards, & Jacobsen, 1965). Across all three studies they found 97% of the intercorrelations to be of a zero-order magnitude. Conversely, only 3% of the intercorrelations were of sufficient magnitude to indicate any significant relationship between grades and physician performance, and more of these were negative than positive. As Price stated in his report to the second annual research meeting of the Association of American Medical Colleges:

> "This is a somewhat shocking finding for a medical educator like myself who has spent his professional life selecting applicants for admission to medical school, and in teaching and grading students after admission. It is true that a strong suspicion that grades have been weighted much too heavily in predicting performance in medical school and after graduation from medical school is what led to the initiation of this whole study in the first instance; but to have that suspicion so forcefully corroborated has led me to question the adequacy of some of our traditional admission policies, as well as the reliability of conventional grades as a measure of progress of the student during his medical course, or as the sole criterion for promotion, or as a dependable predictor of future success in practice. It has also compelled me to re-examine my own concepts of the basic objectives of medical education" (Price, Taylor, Richards,

and Jacobsen, 1964).[2]

Medical College Admission Test (MCAT). Historically, the present-day MCAT represents at least three major revisions in a psychometric movement "to assess knowledge, attitudes, and intellectual skills considered to be desirable in a prospective physician" (Anastasi, 1961). It first appeared as the Moss Medical Aptitude Test which was revised in the late 1940's and appeared as the Professional Aptitude Test. However, shortly after its inception it was reviewed and critically evaluated by Ralph and Taylor (1950; 1952), resulting in the dropping of some of the Professional Aptitude Test scores and changing its title to the present Medical College Admission Test. In its present form the MCAT yields a total or composite score and four subscores, Verbal, Quantitative, Social, and Science.

Interestingly, the decision to incorporate the MCAT in our medical schools' selection programs was made before any evidence was available concerning its validity, predictive or otherwise (Das, 1956; Wantman, 1953). In the initial formulation of the goals of the test emphasis was given to its capacity to identify those qualities which would, by definition, be desired in professional performance (Stalnaker, 1950; 1953). As Anastasi (1961) put it in her recent textbook, "The MCAT was not specifically designed to sample the kind of learning the student would encounter in medical school."

Moreover, continued justifications for the use of the test still emphasize this notion of self-evident value. Wantman (1953), for example, after reviewing the test's literature concluded that since its validity had not been demonstrated it had to be "based on the faith that it has intrinsic validity." In a later review Wesman (1959) reached essentially the same conclusion. It is no wonder, then, that Stalnaker (1951) stated he was "frankly impatient" with those who view the MCAT as an experimental selection tool without showing its correlation with grades or some meaningful external criteria.

Since these reviews of the MCAT, more current research data have appeared, but, by and large, these later data fail to support the test as a sufficiently sophisticated instrument to satisfy the selection programs of individual medical schools. Crowder, (1959) for instance, correlated the four subscores of the MCAT with 187 medical students' first year grade-point-averages and obtained correlations of only .14 for the Verbal score,

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[2] Interestingly, this general lack of relationship between level of academic performance and level of later professional performance has also been observed in the field of applied science. As reported by Taylor and Barron (1963), an analysis of the college scholastic standings of more than 200 NACA scientists and engineers showed that the largest number of personnel receiving the highest job performance ratings did not fall in the top 25 per cent scholastic group, but came from the second and third scholastic quarters. In another series of studies by Bloom (1963), of the productivity of Ph.D. graduates of the University of Chicago it was concluded that general scholastic aptitude did not differentiate the productive and unproductive Ph.D.'s. Comparable findings have been reported by D. W. Taylor (1963) in studying variables related to the creativity and productivity of research personnel in two laboratories.

.21 for the Quantitative, .09 for Society, and .38 for Science. Similarly, with a sample of 239 Cornell Medical College students Knehr and Kohl (1959) obtained correlations of .31 for Verbal, .24 for Quantitative, .36 for Society, and .40 for Science against cumulative, four-year medical school grade-point-averages. In still another study, Hammond and Kern (1959) studied three successive graduating classes (N=208) in terms of the relationships between cumulative grade-point-averages and MCAT scores and found the following median coefficients: .18 for Verbal, .08 for Quantitative, .11 for Society, and .23 for Science.

Using a slightly different methodology, Schwartzman, Hunter, and Lohrenz (1962) also investigated the relationship between MCAT performance and academic achievement. Specifically, they took a sample of 422 McGill Medical College students and separated them into high, middle, and low groups in terms of both MCAT scores and each of the four years of medical school. As such, 16 contingency tables were developed and then analyzed by the chi-square method. None of the values so obtained was significant at the .01 level and only five reached significance at the .05 level: Verbal vs. first-year grade-point-average, Quantitative vs. fourth-year grades, and Science vs. first-, second-, and thrid-year grades, respectively.

In studying 1,000 students of the New York College of Medicine, Hill (1959) found a significant relationship between grade-point-averages and the MCAT. In the study, he observed significant dichotomous interactions between his criterion, first-year grades, (cut at above and below 2.00) and three of the four MCAT scales (cut at above and below 500). However, Hill's use of first-year grades as his only criterion and his method of analysis, which merely stressed the certainty of the existence of non-zero relationships, rather than the magnitude of the observed relationships, certainly limits the importance of his findings.

The graduating class of 1956 of the Michigan College of Medicine was studied by Kelly (1957b) in such a manner that 32 criterion variables were developed and factored into five independent dimensions, three concerned with scholastic achievement and two with personal attributes. Obtained median correlations with these five criteria were all of a zero-order magnitude.

Finally, two recent studies of the MCAT have been completed [illegible] Richards, Taylor, and Price at the University of Utah, (1961; 1962). With a sample of 322 students covering seven successive classes of entering freshmen they found the following correlations between first-year grade-point-averages and MCAT subscores: Verbal .16, Quantitative, .24, Society .09, and Science .23. They then took 65 third-year students and compared their grade-point-averages with their entering MCAT scores and found these correlations: -.05 for Verbal, .10 for Quantitative, -.07 for Society, and -.12 for Science. If valid, these results suggest the predictive validity of the MCAT diminished as students advance into later stages of medical training.

As shown in the foregoing, nearly all of the studies of the MCAT have concentrated on the predictive validity of the test against some criterion of medical school achievement. But this procedure involves two questionable assumptions: (a) significant relationship exists between a student's performance in medical school and his later performance in medical practice, and (b) predictors of medical school performance, such as the MCAT, will also predict on-the-job performance. However, with such disappointing results as have been presented in which the MCAT often failed to even predict academic performance,[3] let alone on-the-job performance, such assumptions are certainly tenious at best.

Moreover, when we turn to the few studies in which some criterion other than academic achievement has been studied the results continue to be disappointing for the MCAT. For instance, Garfield and Wolpin (1961) compared the MCAT scores of 51 medical school dropouts and 575 graduates and found none of the MCAT scales differentiated these two groups. Watson (1955) also found the Professional Aptitude Test, the forerunner of the MCAT, could not distinguish between dropouts and graduates of a class of Washington University medical students.

Anastasi (1961) suggested that faculty ratings might provide a better criterion for the MCAT than medical college course grades. To test this possibility Gough, Hall, and Harris (1963) took the 1958 and 1959 graduating classes of the University of California at San Francisco and had its students rated on ten variables covering clinical judgment, diagnostic skill, and identification with medicine by as many faculty members as knew each student. These ratings were then averaged, intercorrelated, and factor analyzed, yielding three factors for the 1958 ratings and two for 1959 ratings. Disappointingly, the MCAT scales showed an essentially zero relationship with all of these rating criteria.

Another more "intermediate" criterion against which the MCAT has been validated is that of performance during internship. In a study by Richards, Taylor, and Price (1962) internship ratings for 139 graduates were correlated with MCAT scores. They obtained validity coefficients for the MCAT of -.11 for the Verbal score, -.04 for the Quantitative score, -.04 for Society, and -.13 for Science.[4]

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[3] Even corrections for restriction of range for most of the correlations obtained would still yield some zero-order correlations and some non-zero correlations which would generally be unimpressive in terms of per cent of criterion variance accounted for by the non-zero correlations.

[4] Though none of these correlations are very high, their consistent negative trend is interesting in that they do not leave much ground for those who repeatedly argue that restriction of range correlations would yield high positive validities. On the contrary, if anything they would become even more negative.

The most obvious, and perhaps critical criterion for validating the MCAT is that of on-the-job professional performance. Only one previous study has been found which has sought to relate the MCAT to this "ultimate" criterion of performance in medical practice. In this study, Peterson and his associates (1956) analytically evaluated the quality of medicine practiced by 30 general practitioners on whom MCAT scores were available. Overall, no relationship was found between rated quality of medical practice and either medical school grade-point-averages or the four subscores of the MCAT. Although this study was a pioneering effort based on a very small sample of physicians, the results, if proven to be consistent, certainly cast doubt on the assumption of an inherent relationship between the MCAT and on-the-job performance.

Overall, then, the general impression that emerges from these studies is that the MCAT if it is to fulfill the primary purpose for which it was designed, is in need of considerable revision and improvement in predicting immediate (academic performance), and especially intermediate (internship and residency), and more ultimate (professional practice) criteria. At best, it appears to have a low validity for forecasting performance in medical school. Concerning its prediction of completion of medical school, internship performance, and the actual practice of medicine, the validity often seems to be near zero or perhaps even essentially zero. Nor does the picture improve appreciably when we focus on the other most used medical school selection devices.

Admissions Interview. As mentioned in the first part of this chapter, another line of evidence that has been heavily relied upon in evaluating and selecting applicants for medical school training is that of appraisals drawn from personal interviews conducted by one or more members of a college of medicine faculty. Studies of the predictive validity of the ratings from such admissions interviews are infrequently encountered in the literature. At Utah, Richards and Taylor (1961) studied 139 interns and found a correlation of .32 between the recommendations of interviewers and third-year medical school grades.[5] (They also reported a coefficient of .03 between the rating of the premedical teachers and third-year medical grades.) At Michigan, Kelly (1957b) took 32 criterion variables and applied them to 112 graduates. Factor analysis reduced these measures to five major dimensions. He then studied five admission interviewers and found the median interviewer had a median correlation of .05 with the five factorial dimensions. Similarly, Gough, Hall, and Harris (1963) correlated admissions committee interviewer ratings with grades in medical school and found median correlations of .01, .04, .05, and .05 for each of the four-year medical school GPA's. The same researchers also observed a low, but positive trend between these ratings and faculty ratings for two graduating classes. Kelly (1957a) has also commented on the apparent general invalidity of admissions interview as a predictive instrument for medical school performance. A serious deficiency is noted in the complete absence of studies of the value of the widely used but rarely validated admissions interview in predicting on-the-job performance.

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[5] They also reported a coefficient of .03 between the rating of premedical teachers and third-year medical grades. In addition, the MCAT was found to correlate positively with GPA for the first two years of medical school, at a zero-order level with GPA for the last two years of medical school, and slightly negative with performance in internship.

Implications. The foregoing review, although not exhaustive, is believed to be representative of available research in the general area of existing admission procedures for identifying and selecting students for medical school training. To the extent that it is representative, it appears to indicate that existing selection programs are not functioning at an adequately high level of validity. In terms of the immediate criterion of selecting students for admission to medical school, premedical grades show some promise in predicting achievement in the first two years of medical training and perhaps a little promise in forecasting the last two years of achievement. But both the MCAT and the admissions interview generally reveal little value as predictors of either early or late medical school achievement. Moreover, when we turn to the more critical intermediate and ultimate criteria of internship and residency performance and quality of actual medical performance, respectively, we find little evidence as yet and what is available shows very little, if any positive support for the premedical GPA, the MCAT, or the admissions interview as valid predictor instruments. However, it should be emphasized that there is actually not a great deal of evidence, whether positive or negative, for reaching a definitive conclusion about the predictive validity of these selection devices against longer range criteria. More study is clearly needed, particularly in assaying the merit of these procedures in predicting on-the-job performance.

Present Study. The material in the following chapters represents an attempt by a research team of the University of Utah to investigate the predictive accuracy of three medical school selection devices, namely, premedical grades, the MCAT, and the Biographical Inventory for Medicine, a new procedure and testing device, in medical selection. In the study, each instrument is validated against immediate criteria of medical school performances and the more ultimate criteria of on-the-job performances. The more ultimate criterion measures employed are the result of an extensive year-and-a-half study of some 800 practicing physicians representing three major areas of medical practice: general practice, specialty practice, and medical school faculty "practice". As such, it is hoped that, although these criterion measures have certainly not exhausted the measurement of physician performance, the study is far more comprehensive in its criterion coverage than any study to date and thus represents a quite comprehensive and thorough examination of the three predictors in terms of their accuracy in forecasting medical school achievement and quality of many types of performance in medical practice.

Chapter II

The Biographical Approach to Selection and Prediction

As indicated at the end of Chapter I, the present study investigates the predictive ability of three medical school selection devices for on-the-job physician performance, namely, premedical grades, the MCAT, and the Biographical Information Inventory for Medicine (BIM). Since the later, the BIM, represents a newly devised selection instrument for the medical school, it is worthwhile to briefly review its history and application.

Typically, a biographical information inventory is composed of a collection of questions relating to the incidents, feelings, opinions, interests, and attitudes that an individual has experienced over his life span (Nielsen, 1961; Roe, 1951; Needham, 1958; Fryer & Henry, 1950). The content of such items usually focus on the individual's developmental history, his parents and family life, his academic life, and his adult life and interests. Most biographical information inventories are structured as a series of multiple-choice itmes or questions which are more susceptible to empirical verification than the usual personality blank or test. As such, a biographical information inventory can encompass a great deal of information in a relatively short period of time and space. Moreover, such inventories need not be restricted to strictly factual material, thus allowing them to cover such things as preferences, attitudes, and personal interpretations of past experiences. Potentially, then, the biographical inventory approach is capable of sampling much larger and more numerous domains of the individual's experiences than most psychometric devices currently in use.

Moreover, there are both theoretical and experimental bases for the notion that properly constructed biographical inventories can predict such highly complex behavior as physician performance more adequately than many other predictive instruments. At the theoretical level, at least two justifications can be presented for using personal history information in predicting behavior (Nielsen, 1961). First, the social sciences have long argued that environmental and historical circumstances are important determiners of the individual's present and future psychological constitution. Thus, within this perspective the biographical inventory is viewed as a device for sampling the person's environmental and historical circumstances and, through appropriate statistical analyses, isolating those events which are of particular significance to a given behavioral syndrome, in this case performance as a practicing physician.

The second argument favoring the biographical approach is that of the increased heterogeneity of the instrument over traditional psychometric devices. Customarily, psychological tests have been developed in such a manner that each of their items or questions show a high relationship with a single criterion. In other words, the tests were developed to ensure homogeneity of their items. Inherent in this procedure is the assumption that the criterion, the thing for which the test is designed to predict, is also relatively unidimensional or homogeneous. However, in view of the general failure of such instruments to reach acceptable levels of prediction and in view of the apparent complexity of human behavior in most life-like situations, particularly in such things as on-the-job performance, it may be more realistic to assume that a heterogeneous predictor whose individual items only account for a small proportion of the criterion's variance may be more effective in predicting an equally or even more heterogeneous criterion.

Review. At the empirical level, considerable evidence has accumulated supporting the usefulness of instruments with personal history information as their prime component. Biographical material in various forms has been used for many years in a variety of human oriented pursuits, e.g., in social work, psychology, personnel selection, psychiatry, and the armed forces. The formal use of such information, especially as derived by biographical inventories, seems to have been initiated by Goldsmith (1922) and followed up by Kornhauser & McMurray (1941) and Kurtz (1942) in predicting salesmen performance. Bittner (1945) utilized biographical information to predict college attendance or nonattendance. The U. S. Army (Adjutant General's Office, 1946) developed a biographical inventory that isolated past experiences and personal characteristics related to success as an officer. Boyton (1940) found hobbies have a close relationship to important personality characteristics of school children. Guilford & Comrey (1948) attempted to predict proficiency of administrative personnel from personal history data. Ohman (1942) was relatively successful in using a weighted biographical application blank to predict success as a building material salesman. All in all, the 1940's witnessed the advent of biographical data as a serious and relatively successful predictive device for a variety of occupations and skills.

Since the 1940's biographical data has increased in its applications in the social sciences and has continued to show promise as a basis for potentially powerful predictive divices. For example, a host of studies have successfully employed the biographical approach in predicting academic achievement. Hansen (1950) obtained both initial and cross-validity coefficients of about .60 in predicting high school grade-point-averages (GPA) from biographical scores, and coefficients ranging from .40 to .60 in predicting other academic and behavioral problem criteria. Taylor, Cooley, & Nielsen (1963) found biographical information was the best of several predictors of creative scientific talent for high school students engaged in research work. Similarly, Cline, Richards, Abe, & Needham (1963) obtained cross-validities ranging from .24 to .63 for criteria ranging from GPA to a teacher rating on achievement in science. Bunderson, Rigby, & Taylor (1963) reported that the biographical inventory was the best single predictor of academic achievement for recipients of university level fellowships. Although MacCurdy (1954) reported no validity coefficients, he claimed success in using biographical information to predict successful science students. Stein (1963) also reported certain biographical characteristics discriminate more creative scientists from less creative scientists.

In the same vein, Sorenson (1950) conducted an item analysis of a biographical device by using criterion groups of "bright passing" and "bright failing" college students. Approximately 50 per cent of the items discriminated significantly between these two criterion groups. When these scoring keys were applied to an independent sample, the biographical scores correlated .36 with first quarter college grades, and .42 with high school GPA in basic subjects. Significantly, the study reported relatively low coorrelations between the biographical scores and both the cooperative tests and the American College Entrance Examination (a good finding since a combination of relatively non-overlapping predictors is desired). At Fordham University, Anastasi, Meade, & Scheiders (1960) developed a scoring key from an analyses of 303 biographical items on a sample of 50 students in each of three criterion groups. Correlational comparisons with this instrument and other aptitude, achievement, personality and interest tests indicated that the biographical device differentiated the criterion groups more effectively than any of the other predictors. Finally, Duff & Siegel (1960) found statistically significant correlations between 5 of 10 subscales of the Biographical Inventory for Students and first semester GPA of students. All in all, then, there seems to be considerable justification for utilizing biographical information as an effective instrument for predicting several types of academic achievement.

Another area in which the biographical approach has received widespread use is in predicting the creativity, productivity, and general characteristics associated with job success in the physical sciences. Roe (1951; 1953), for example, studied a group of eminent scientists and reported they had a greater than chance number of first-born, they tended to come from middle or upper class backgrounds, their parents had superior educations, and they expressed late development of heterosexual interests, childhood feelings of isolation, a general avoidance of intimate personal contacts, and a limited adult social life. In another study in an engineering situation, Sprecher (1957) found all of his biographical variables had at least one significant relationship with his criteria of peer and supervisor ratings, number of patent disclosures, and judged supervisory scores on three open-ended questions. Ellison (1959) constructed and administered a 527-item biographical inventory to a sample of scientists with considerable success. Later follow-up studies by Taylor & Ellison (1963; 1964) have predicted on-the-job scientific performance with cross-validities in the .40's and .50's, and the biographical scores worked better than any other of the 130 scores obtained on Air Force scientists.[6] It is interesting to note that the same characteristics of successful scientists found by Roe were also reported by Ellison.

In still another study, Albright & Glennon (1961) found biographical information could discriminate between supervisory and research oriented scientists at all levels of a laboratory organization. Earlier Donald Taylor (1958) reported studies in the Navy Electronics Laboratory where he found several items of a 50-item biographical questionnaire related to creativity. His results, however, did not hold up when they were cross-validated on a sample of physicists at the Naval Ordnance Test Station at China Lake. It was felt that the scoring developed for the electronics engineers might not have been appropriate for the physicists, and if this were so, it would suggest that biographical data can be applied to highly specific selection tasks (and may need special keys for different groups).

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[6] See also Taylor, Smith, & Ghiselin (1959), Taylor, Smith, Ghiselin, & Ellison (1961), and Taylor, Smith, Ghiselin, Sheets, & Cochran (1958).

Nor do the areas of academic achievement and performance in science exhaust the studies since 1950 of the predictive value of biographical information. Still other researchers have utilized this approach in a variety of situations to fill quite specific functions. Russel (1950), for example, developed a 37-item biographical index which successfully differentiated "most desirable" and "least desirable" hospital aides. In the area of psychiatric vocational rehabilitation, Mortensen (1960) obtained highly significant cross-validation correlations by using a 140-item biographical information inventory to predict which psychiatric patients would be successful in vocational rehabilitation. In another study concerned with the selection of combat and noncombat military personnel, Himelstein & Blaskovics (1960) reported that according to selected biographical data, if an individual has tended to engage in risk taking activities, such as contact sports, auto racing, and gambling, he will also tend to be more effective in combat. Earlier, and in the same vein, Egbert and others (1957) used a life history inventory in their analysis of combat fighters and non-fighters to tap areas that were not covered in their battery of tests. Turning to another area, Wilson (1958) found a biographical information blank could effectively predict labor turnover among bus and streetcar operators. All in all, these studies highlight the potential versatility of the biographical approach for differential prediction and selection in almost any area of human endeavor.

Medicine. Turning now to the topic of the present study, namely medical school selection and prediction, we generally find that only fragmented research has been reported on the biographical approach. By and large, these attempts have concentrated on the relationship between success in medical school and such background variables as age, number of premedical hours, and type of premedical training. Results of these investigations have varied considerably. Moursund (1941) found that students with the B. S. degree do better in medical school than those with the B. A. degree. Stuit & Schlicher (1948) report just the reverse. Schlesser & Roberts (1941) found no significant difference in medical achievement related to the premedical major course of study. A greater number of failures and withdrawals from medical school was noted in the older groups by some researchers (Dykman, 1955; Miller & Morris, 1954; Moon, 1934, 1938; Ralph & Taylor, 1952). Moon (1938) found no difference in the grades obtained between a group of older students who completed the medical curriculum and younger groups of students. Other authors report little or no relationship between age and grades (Cramer, 1933; Douglas, 1942; Shoemaker & Rohrer, 1948). Concerning the relationship between medical school grades and the number of premedical college hours, some studies report a negative relationship (Moon, 1938; Moursund, 1941; Stuit & Schlicher, 1948), some report a zero-order relationship (Hurd, 1949; Moss, 1930; Shoemaker & Rohrer, 1948), and over three decades ago, a positive relationship was reported by Wycoff (1927). Hurd (1949) found that students from urban communities tended to do better than those from rural areas and wondered whether urban life provided more social experience, maturity, and sophistication, or merely better schools. Finally, it is interesting to note that no demonstrable relationship has been reported for the father's occupation, including students of medical parentage

(Moursund, 1941; Stuit & Schlieher, 1948).

In a very comprehensive study by Weiskotten and others (1960) a number of surprising relationships were found for the biographical variable of age at graduation from medical school. In their nationwide analysis of graduating medical classes from 1915 through 1950 they found that the 1950 class had the oldest average age at graduation of any class surveyed. This age composition was not unexpected, since nearly half of the graduates had served in the armed forces before entering medical college. In analyzing this latter class they found the following: (1) over one-third of them in private, non-institutional practice were in partnership and group practice, (2) only a few of these graduates were either in general practice or giving special attention to a specialty, (3) over a third of these students who limited their practice to a specialty reported that they had decided upon their field of specialization before graduating from medical school, (4) these students tended to go to states with medical schools having high per capita income, (5) the state in which residency training was received for this class was the most important factor studied in determining the state of eventual practice, (6) 82 per cent of these graduates went to public medical colleges, and (7) 40 per cent of this class ended up practicing in a community of about the same size as that in which they lived before entering medical college. Although these results are not particularly pertinent to the present research, they do show the wide potential predictive value of even a single biographical characteristic such as age at medical school graduation.

A series of studies have employed the biographical technique to discover marked shifts in student thinking about their careers as they progress from class to class. One type consists of a shift from the predominant choice of a rotating internship among first-year students toward the selection of straight internships (medicine, surgery, pediatrics, obstetrics) by third-year students (Merton, Reader, & Kendall, 1957). A second type consists of a shift from the predominant choice of general practice among first-year students toward the selection of a specialty practice by fourth-year students (Cahalan & Collette, 1956; Funkenstein, 1958; Merton, Reader, & Kendall, 1957). A third type consists of multiple shifts among the individual specialists (Gee & Glaser, 1958; Kendall, Glasser, & Emory, 1958). Finally, follow up studies of graduates show that physicians continue to change from general practice to full-time specialization during their active professional careers (Terris & Monk, 1958; Weiskotten, 1928, 1932, 1937; Weiskotten & Altenderfer, 1952; Weiskotten, Wiggins, Altenderfer, Gooch, Tipner, 1960, 1961). It is quite likely that such shifts in interest, attitudes, and motivation could play an important role in the effectiveness of any medical school selection or prediction program.

Johnson (1960) reports a detailed, 9-year study of 688 medical students of the Upstate Medical Center in which he utilized an "actuarial" approach to the prediction of success or failure in medical school. Although not confined to biographical data, his study reports the following findings with such material: (1) a consistent rise in drop-out rate with age of medical school admission, (2) students married at the time of admission have a higher chance of academic difficulties than unmarried students, (3) married students with children have an even higher incidence of academic difficulties than married students without children, (4) students attending more than one premedical college or university are poorer medical school risks than those who take all of their training in one institution, and (5) non-science premedical majors have a greater drop-out rate than science majors. In view of the expense involved in training a physician, such findings from biographical data certainly show promise in reducing the loss rate in our medical colleges through effective pre-admission testing and prediction.

The first reported systematic study in medicine based soley on biographical information is that of Schumacher (1961) in which he investigated the relationships between certain personal, social, and educational background factors and the student's choice of career at the end of his senior year in medical school. It was based on a sample of 1000 randomly selected students from 25 medical schools. The data used in the study were drawn from a biographical questionnaire that was administered at the beginning of the first year and at the end of the fourth year in medical school. To illustrate the wealth and type of information that can be obtained from biographical information, here is the summary of Schumacher's report in which he describes the "average medical school graduate:"

1. He comes from a wide variety of home situations, but generally from a small urban family with parents who are above average intellectually.

2. He did well academically in high school. As an undergraduate, he preferred courses in the biological and physical sciences and the humanities, but showed little interest in the social sciences or languages. Even though mathematics was not one of his most preferred areas, he took at least one introductory college course in this subject.

3. He chose medicine after rejecting a career in some other profession, probably college teaching, engineering, or scientific research in a field other than medicine. His present plans for a specific type of medical career were probably made during the past two years.

4. He is probably married, and, if so, he has about a 50-50 chance of having one or more children.

5. He has about a 50-50 chance of being in debt, probably somewhere between $1,000 and $3,000.

Major differences found among groups planning to enter different types of medical careers were the following:

1. Students selecting a general practice career appear to come from families somewhat less well situated financially, they tend to marry earlier, and to have more children than students choosing either specialty practice or academic careers.

2. The group planning straight specialty practice careers is similar to the general practice group with respect to a preference for biological sciences in college and a lack of interest in mathematics. Noteworthy differences between these two groups appear in the areas of marital and financial status and, to a lesser degree, in family background.

3. The group planning to combine specialty practice with an academic career stands between the straight specialty practice group and the full-time academicians on many personal history dimensions. Examples are: amount of training in mathematics, interest in the biological sciences during college, preference for research and teaching in general, and time of decision about a specific medical career. The largest proportion of physician fathers are found in this part-time academic group, and these students are more likely to come from small urban families than any other group. A smaller percentage are married, they have fewer children, and are less likely to be in debt than any other group.

4. The relatively small group planning a full-time academic career is distinguishable from the other career groups in terms of more training in mathematics, greater interest in the physical sciences during college, a stronger interest in teaching or research careers in general, and a higher proportion of fathers who are professional men but not physicians.

It should be noted, however, that this description of the average graduate was taken from a descriptive analysis based only on percentages and not correlation and that it did not concern itself with predicting internship, residency, or on-the-job performance.

At about the same time as the Schumacher study, Funkenstein (1961) conducted another investigation in which five biographical variables were employed in predicting senior medical students who chose to abandon the pursuit of medicine. In comparing these students in terms of whether they had a "favorable" or "unfavorable" image of the physician, he found (1) students from small towns had a more positive image than those from large cities, (2) students who reported undue parental pressure to enter the medical profession reported unfavorable images of physicians, (3) those who viewed the physician unfavorably also tended to view premedical students unfavorably, (4) students with an unfavorable physician image tended to make higher science grades than students with favorable images of physicians, and (5) no significant differences were found between the two senior drop-out groups in terms of their fathers' occupation or whether they attended public or private secondary school.

Also, Schwartzman, Hunter, & Lohrenz (1962a, 1962b;) studied the relationship between academic performance and a number of scholastic, socio-economic, and intellectual factors in a group of 422 medical students at McGill University. Of the biographical variables investigated the following associations were found: (1) McGill premedical students performed significantly better in the first three years of medicine, but not the fourth, than students who attended other premedical schools; (2) those students who were age 21 years or under on admission to medical school did significantly better than those who were ages 22 and 23, and the latter students did significantly better than those who were ages 24 or more years at the time of entry; (3) students whose fathers were born in non-English speaking countries performed significantly better than others; (4) a decreasing association was found between medical school performance over four years and the compulsory premedical subjects of organic chemistry, English, physics, introductory chemistry, and biology, respectively; and (5) inconclusive results with regard to the relation between medical school achievement and socio-economic status and type or length of premedical training. It is interesting to note that these results generally corroborate the previously mentioned findings of Schlesser & Roberts (1941), Dykman (1955), Miller & Morris (1954), Moon (1934, 1938), Ralph & Taylor (1952), Moursund (1941), Stuit & Schlicher (1948), and Johnson (1960).

Perhaps as a result of the encouraging findings of his 1961 report which was described in the preceding material, Schumacher (1964) conducted another study two years later in which he investigated three psychometric dimensions--scholastic aptitude, interest and personality characteristics, and biographical histories--as predictors of choice of type of medical career. His subjects were over 5[illegible] first-year interns who had been tested on these three psychometric dimensions at the time they entered medical school, and who had indicated at the end of their first year of internship that they were planning to enter one of the following five types of careers: general practice, full-time specialty practice in internal medicine, full-time specialty practice in surgery, part-time specialty practice plus research and teaching in medicine, and part-time specialty practice plus research and teaching in surgery. With the variable of the difference in size of home community, fully two-thirds of the students who chose part-time academic careers were raised in or around large cities, about half of those planning to enter straight specialty practice were from large cities, and less than one-third of those choosing general practice were raised in a large-city environment. Concerning the variable dealing with type of premedical school, about three-fourths of the interns choosing part-time academic careers did their premedical work in private colleges or universities, while only about 60 per cent of those planning full-time specialty practice careers, and less than half of the general practice group, attended private premedical colleges. Finally, with the variable of admission marital status, almost half of those choosing general practice were married at the time they entered medical school. Of those choosing some type of specialty practice or academic career, less than one-fifth were married prior to entering medical school. Although only three biographical variables were employed in this study it highlights the kind of research that can and should be done in medical school selection and prediction.

In summary, the preceding review, although not exhaustive, is felt to be quite representative of available research in which the biographical approach has been utilized in selection and prediction. To the extent that it is representative, it certainly emphasizes the variety of situations in which this approach has found application. Moreover, in view of the general success of this approach the review strongly suggests the potential of the procedure in a complex situation such as that of medical school selection and prediction. To date, the research results compare favorably with the best predictions that have been made in educational and industrial work. However, as indicated in this review most of the studies in the medical setting have been rather fragmented in the sense that biographical information was only incorporated in a larger research design in which several other approaches were being investigated simultaneously. As such, the potential of biographical information in predicting medical achievements has not been given a full or fair chance. The material in the following chapters represents an exploratory attempt to give this technique such a chance.

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A postscript to this chapter is that on June 10-11, 1965, we participated in a research conference chaired by Edwin R. Henry and held at Sedgefield Inn, Greensboro, North Carolina in which the entire discussion was focused upon the usefulness of biographical information for prediction purposes. Under sponsorship of the Creativity Research Institute of The Richardson Foundation, Piedmont Building, Greensboro, a preliminary version of the verbatim conference report has already been produced entitled "Research Conference on the Use of Autobiographical Data as Psychological Predictors."

Chapter III

Development of the Biographical Inventory for Medicine

The major contribution of the present investigation is the development, application, and validation of an extensive Biographical Inventory for Medicine (BIM) against the criteria of medical school achievement and on-the-job physician performance. The concern of the present chapter, that of the development of the BIM, was initiated and sustained throughout by a team of individuals who brought together comprehensive knowledge and understanding of the field of medicine, skill in the application of the principles of personnel measurement, and previous experience with biographical inventories in other areas of human endeavor. As such, it is felt that the resulting form represents the most thorough and systematic biographical inventory constructed to date for the medical profession.

Producing and Collecting an Item Pool. The first step in the development of the BIM was that of producing and collecting a sufficiently large pool of biographical items or questions which would comprehensively cover the life-history of any practicing physician. In so doing, several sources were relied upon. For one, previous experience by Taylor & Ellison (1963, 1964) at the University of Utah in using the biographical approach to predict achievement in the physical sciences supplied the authors with a well-developed pool of biographical items from which items could be drawn. Thus, one source of items for the BIM was all those items from the research of Taylor & Ellison that had demonstrated predictive value on the physical sciences and which were also judged to be applicable to the medical setting. All totaled, 87 such items were included in the final research form of the BIM.

The second source in developing our item pool was that of professional publications. Specifically, a review was made, covering the last ten years of the Journal of Applied Psychology and the Journal of Medical Education, for any research in which biographical variables were found to predict medical school, internship, residency, or on-the-job medical performance. Such findings were then cast into multiple-choice form and inserted into our growing item pool. As with the first source mentioned in the last paragraph, all such items were included in the final research form of the BIM. However, in both cases some of the items were later revised to meet our multiple criteria for item acceptance which is described later in this section. Forty-seven such items developed from leads in the literature were retained in the final form of the BIM.

The third source of information for biographical items was the mass of information that was collected in our previous research on criterion measures of physician performance (Price, Taylor, Richards, & Jacobsen, 1965, 1964, 1963; Richards, Taylor, Price, & Jacobsen, 1964; Taylor, Price, Richards, & Jacobsen, 1964). In this research, some 500 Utah physicians were subjected to an intensive, hour-long, structured interview in which a variety of verbatim information was collected concerning various aspects of their medical practices. For the present investigation, a careful search was made of these data for appropriate material that appeared to be significant for a biographical inventory. This material was written in multiple-choice form and placed in our item pool for further evaluation and possible insertion in the final BIM. Sixty-two items were produced by this procedure.

The fourth and final major source of items for the item pool was the members of our project staff who had conducted the criterion interviews for the 1963 study. Throughout the period in which physicians were being interviewed, all interviewers were asked to bear in mind that a biographical inventory would be developed in the future, and, on the basis of their varied experiences with the physicians, they were to generate as many biographical items as they could which would be appropriate to the aims and purposes of the present study. Surprisingly, this proved to be the most productive source for building our initial item pool since some 800 items resulted from it.

All in all, from these four major sources approximately 1,000 different preliminary items were collected. Obviously, such a large item pool provided an excellent basis from which we could assemble a rather comprehensive biographical inventory. Also, at this point in the development of the BIM it was decided that all of the items in the pool should be viewed as potentially acceptable items for the final form and would be first subjected to appropriate revisions so as to make all of them "good" test items before any culling, weeding out, or rejection took place.

Revising the Item Pool. Biographical items, if they are to contribute to the effectiveness of an inventory, must each possess the characteristics of a "good" test item. Since it was decided that all of the 1,000 initial items of the item pool were to be retained at this point in the development of the BIM, the next step in its development was to carefully edit and revise each of them according to appropriate criteria. Thus, each item was checked and altered when necessary to ensure that they conformed to at least the following requirements.

Two methodological considerations dictated that a five-alternative, multiple-choice format would be most applicable. First, due to the enormous amount of data to be collected and analyzed it was imperative that the data be processed through high speed computers. Secondly, an excellent computer program for analyzing multiple-choice items existed at the University of Utah, which required that the alternatives or answers to each item or question be five in number and be structured in such a manner that all five fit into a quantitative continuum. Thus, each item in the item pool was revised so that it consisted of a question followed by five alternatives which were arranged in a verbal, quantitative, continuum (e.g., "all the time," "quite frequently," "occasionally," "seldom," and "rarely or never.") Moreover, to ensure that each alternative would contribute to the BIM's discriminability they were all checked or rewritten so that a sizeable percentage of people would be expected to choose each of the alternatives. For example, in the following item the alternatives would not meet this requirement because alternatives "C," "D," and "E," would seldom be chosen while "A" and "B" would usually be chosen:

How many brothers and sisters did you have
in your immediate family?

A. 0-3
B. 4-6
C. 7-9
D. 10-12
E. More than 12

On the other hand, if the alternatives were changed to the following all of them would stand a good chance of being selected by some of the testees:

A. 0
B. 1
C. 2
D. 3
E. More than 3

In addition to the foregoing, each item was edited for clarity. This included such things as eliminating grammatical errors; keeping the language of the statements and alternatives simple, clear, and direct; checking that each question dealt with only one thought, event, or attitude; avoiding such universal terms in the statement or question as "all," "always," "none," "never;" avoiding compound or complex sentences; eliminating double negatives; etc. In general, the procedures generally advocated for sound item construction were followed at this point (Payne, 1951; Edwards, 1957; Adkins, 1947).

Evaluating the Item Pool. Once the initial pool of some 1,000 biographical items was revised and edited so that each represented a good item in terms of the item construction criteria, the next logical step in developing the BIM was that of reducing the pool to "manageable size." In this case, manageable size was dictated by the capacity of the computer program for evaluating multiple-choice items. Specifically, the program was limited to a maximum of 300 items. Thus, for this and other practical considerations it became the task of the project staff to reduce the vast pool of items to no more than 300 biographical questions.

To accomplish this reduction, seven persons who had interviewed physicians in the 1963 criterion study were asked to independently rate each item on a 5-point scale in terms of its "potential effectiveness in evaluating significant conditions or experiences in the life-history of a typical physician." Any item which had a combined rating by the seven judges or interviewers of 25 or more was retained. Conversely, any item having a combined rating of less than 25 was dropped from the item pool. All totaled, 332 items were retained by this procedure.

These 332 surviving items were then sorted for content. This sorting produced four content areas into which the items could be classified: (1) Parents, Home and School Life (89 items), (2) College Life (73 items), (3) Adult Life (28 items), and

(4) Professional Life (142 items). Accordingly, the items within each content area were separated and arranged, as much as possible, to represent a logical sequence of life-history events. .

Inserting Landmark Items. Of considerable concern to most investigators who develop tests or measures of human behavior is the question, "what is being measured?" However, with an inventory of the size of the present study and with the inherent heterogeneity of the biographical items comprising the inventory, such a question becomes quite complex. For example, if it was found that a variety of items on such things as membership in the Boy Scouts, on being the youngest child in a family, on having some musical training, and on the frequency of playing hooky from high school were all related to some measure of on-the-job performance, the researcher would be hard put to explain with certainty what was being measured by this constellation of biographical items. This is particularly true in view of the relative newness and lack of research with the biographical approach. Thus, for the researcher interested in such questions, little data are available on which one can formulate explanatory hypotheses.

One possible aid is to insert into a biographical inventory a few items or questions from another well researched area. This would provide the investigator with "landmarks" from which he could draw inferences about what was being measured. For instance, in the immediately foregoing example if it were found that a subset of the biographical items related to on-the-job performance were also related to an item known to measure "hostility," one might infer that what was being measured by the predicting subset of biographical items was some form of hostility. Following the same rational, the present study inserted 18 "landmark" items drawn from French's (1953) factor analytic review of existing personality tests which have been comparatively well researched in the psychological literature. As such, each of these items measures one of 18 relatively stable personality dimensions which are well established in personality research. All totaled, then, with the addition of these items the final form of the BIM which was administered to all subjects in the present study comprised 350 items or questions [7] (see Appendix A for a reproduction of the entire inventory).

Item Analysis and Validation. In a previous section dealing with the evaluation of the item pool it was indicated that due to computer limitations the BIM could only be 300 items in length. Also, in the immediately preceding section it was indicated that the form administered to all physicians in the present study consisted of 350 items. Thus, 50 items had to be eliminated after the physicians in each sample studied had completed the BIM. To accomplish this, intercorrelations were first computed between the 350 items after they had been administered to all of the participating doctors. Then, those items that were most highly intercorrelated were ranked in terms of magnitude of their intercorrelations. Finally, of those items that were most highly intercorrelated with at least one other item only one of such a cluster of items was retained while the others were eliminated. This process was sequentially repeated until the desired 50 items were eliminated, thereby allowing the remaining 300 items to be processed and analyzed through the computer. Again, the same 300 surviving items were analyzed with each group studied in this project.

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[7] Fifty of these items were eliminated later in the data analysis of each sample. However, all 350 items were administered to each participating physician in this study.

Once the BIM was reduced to the required 300 items it was subjected to the following item analysis procedure with each group of physicians reported in the following chapters. In essence, this procedure involved (1) determining the relationship between each alternative of each item and each criterion measure (2) developing an item alternative "key" for each criterion, which, in effect, retained only those item alternatives that showed a statistically significant correlation with the particular criterion measures, (3) rescoring each doctor's BIM performance on the basis of the item alternative keys, and (4) computing validity coefficients between the BIM keys and the criterion measures.

In determining the relationship between each alternative of each item and each criterion measure, biserial correlations were computed for each of these relationships. Thus, if ten criterion measures were available for a given sample of physicians, 15,000 biserial correlations were computed. As such, an objective index of the relationship between all item alternatives and all criteria was available from which decisions could be made in terms of whether a given alternative should be retained or rejected in predicting a given performance criterion.

The next step in the item analysis for every sample of physicians studied was to develop a scoring key for each criterion. This involved (1) reviewing the biserial correlations between item alternatives and a given criterion measure and (2) finding the percentage of physicians within the sample studied who responded to each item alternative. Then, if an alternative of an item both correlated highly with the criterion and was responded to by a certain percentage of the sample studied, it was judged to be significantly related to the criterion and was retained.[8] This resulted in a master list or key of significant BIM item alternatives for each criterion.

Once keys for each criterion on each sample were developed, each physician's BIM responses were reviewed and rescored. In rescoring the physician's responses only the keyed alternatives were considered. If the physician responded to a keyed alternative he was given a score of "+1" if the alternative correlated positively with the criterion in question and "-1" if it correlated negatively with the criterion. These individual scores were then summed for each physician. The four sectional breakdown of the BIM was also retained in the scoring. Thus, for every sample of physicians studied each doctor received 5 BIM scores (Parents, Home, and School Life, College Life, Adult Life,

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[8] In all of the studies of this report the minimal levels were a correlation of at least .15 and at least a 15% response to the item alternative.

Professional Life, and a Total Score) for every criterion measure investigated.

To determine the efficiency of each criterion key, "concurrent" validity coefficients were computed between the keyed scores and the criterion scores. As such, for each sample studied an assessment was made of how well the various criterion measures could be predicted by their corresponding or keyed BIM item alternatives.

In the immediately foregoing, it was indicated that concurrent validity coefficients were utilized as indices of the efficiency of the BIM. As such, these validity coefficients were computed from the same data used in making the item analyses and in developing the scoring keys. Admittedly, such empirically developed initial validity results should be viewed with caution. However, independent measures of validity are quite expensive, especially with a profession such as medicine where the physician's time is both valuable and limited. One alternative, which was employed as much as possible in the present research, is that of "double-cross validation." In other words, a given sample of physicians was randomly split into two equal sized groups and empirical BIM keys were developed as before on the basis of the first sample and then applied to the second sample and vice versa. Unfortunately, this procedure reduced the sample sizes by one-half and thereby limited its applicability. Nevertheless, where samples were judged sufficiently large to follow this design, it was utilized in the present research.

In summary, the Biographical Inventory for Medicine has gone through a lengthy series of developmental and evaluational steps; ranging from collecting a diversified rough pool of some 1,000 items to refining and eliminating these items to a manageable and relatively sophisticated inventory of some 300 questions. These surviving questions were then administered to appropriate physician samples and evaluated through another series of statistical analyses until specific questions could be answered concerning the validity of each alternative of every one of the 300 items. Computationally, this has involved about 125,000 biserial coefficients between the item alternatives and various criterion measures, the development of approximately 80 empirical scoring keys, and the reporting of some 500 validity coefficients, to mention but a few examples of the total effort. It is hoped that the following chapters will convince the reader that the effort was thorough, comprehensive, and worthwhile.

Chapter IV

Predictors of Academic Achievement in Medical School

In the first chapter of this report, it was pointed out that two lines of evidence that have been heavily relied upon in evaluating and selecting applicants for medical school training are premedical scholastic achievement (Premedical GPA) and performance on the Medical College Admission Test (MCAT). In the present chapter, an effort is made to evaluate the predictive efficiency of both of these devices, plus the Biographical Inventory for Medicine (BIM),[9] against the general criterion of medical school performance. As such, this study can be viewed as (1) an attempt to corroborate the generally discouraging findings of the researchers mentioned in the first chapter in studying the MCAT and the Premedical GPA and (2) an attempt to evaluate the predictive potential of the BIM in a medical school setting.

Subjects. The population from which the present sample was drawn consisted of the approximately 1,000 physicians currently practicing in the state of Utah (both Utah and non-Utah alumni) and all of the approximately 300 graduates of the College of Medicine of the University of Utah who have completed their internship and residency and who are now practicing outside of Utah. The sample studied in detail in this chapter consists of those 754 physicians from this combined population of 1,300 who agreed to participate in the present investigation. This sample included physicians from diversified types of practice, from all age groups, from various sorts of social, economic, and professional environments, and from many different medical schools and hospital training backgrounds.

Predictors. The predictors of medical school performance studied in this chapter are Premedical GPA, scores on the MCAT, and scores derived from the BIM. Premedical GPA's were obtained, with the consent of the participating physicians, from the official transcripts of the colleges or universities they had attended for their premedical training. The computation of the Premedical GPA's was carried out by the project staff in such a manner as to yield comparable measures from one college or university to another. All four MCAT scores (Verbal, Quantitative, Social, and Science) were obtained from the annual publications of the Association of American Medical Colleges on the MCAT.

With the BIM, two procedures were employed in its administration. For the cooperating physicians practicing in the state of Utah (N=649), the BIM was delivered to their offices by a member of the project staff after they had responded positively to a letter inviting them to participate in the overall study. During the office visits the staff members reviewed the instructions with the physicians, clarified any questions or misunderstandings, and instructed them to return the form through the mail to the project office after they had completed filling out the inventory. For the graduates of the University of Utah College of Medicine who were practicing in areas outside of Utah and who agreed to cooperate in the study (N=105), instructions for completing and returning the inventory were handled entirely by mail. Overall, these procedures seem to have worked quite well in comparison with other attempts to collect research data through the mail; approximately 65 per cent of the physicians in Utah and 33 per cent of the physicians outside of Utah complied.

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[9] It should be noted that the BIM was constructed with the aim of predicting performance on the job rather than academic achievement in medical school. However, with the data available it was felt worthwhile to also investigate its predictive effectiveness for medical school achievement.

The methodology for scoring the BIM outlined in Chapter III was followed throughout. Empirical keys were developed separately for each of the three criteria studied in this chapter. On the basis of these keys every cooperating physician's BIM responses were then scored to yield four sub-scores (Parents, Home, and School Life; College Life; Adult Life; and Professional Life) and a composite Total Score for every one of the three criteria.

In summary, from these three types of predictors (Premedical GPA, scores on the MCAT, scores derived from the BIM) ten predictor scores were obtained from the 754 cooperating physicians: Premedical GPA, the four sub-scores of the MCAT, and the four sub-scores plus the Total Score measure of the BIM. The intercorrelations between these ten predictors are presented in Table I. It is noted in Table I that the MCAT sub-scores were found to be fairly highly intercorrelated, suggesting that not too much loss in predictive efficiency would occur by reducing the length of the test. Finally, comparisons of the Utah physicians (N=649) and the non-Utah physicians (N=105) on the Premedical GPA measure and the four MCAT scores by means of t-tests failed to indicate any significant differences.

Table I

Intercorrelations Between Predictors of Medical School Performance*
(N=754)

	1	2	3	4	5
1. Premedical GPA	---				
2. MCAT: Verbal	.02	---			
3. MCAT: Quantitative	.01	.44	---		
4. MCAT: Social	.01	.62	.43	---	
5. MCAT: Science	.02	.35	.50	.36	---
6. BIM: Parents, Home, School Life	.01	.09	.30	.30	.32
7. BIM: College Life	.02	.12	.22	.21	.16
8. BIM: Adult Life	.03	.07	.03	.02	.03
9. BIM: Professional Life	.10	.04	.16	.23	.21
10. BIM: Total Score	.06	.09	.32	.36	.34

*Intercorrelations reported between the BIM scores and the five other predictor scores were found in a double cross-validation study (N=377 for each sample). They are those obtained with one of the samples. Comparable correlations were found with the second sample in all cases. Also, with the BIM a new empirical key was built for each of the other five predictors. The intercorrelations reported between Premedical GPA and the MCAT scores are independent indices.

Criteria. The three criteria against which the ten predictor scores were validated were: (1) grade-point-average for the first two years of medical school, (2) grade-point-average for the last two years of medical school, and (3) cumulative grade-point-average for all four years of medical school (i.e., a composite of (1) and (2)). These measures were collected and standardized in the same manner as the Premedical GPA. As shown in Table II, these three criteria were found to be rather highly intercorrelated. Computed t-tests between the Utah physicians (N=649) and the non-Utah physicians (N=105) on these criteria did not reveal any significant differences between groups.

Table II
Intercorrelations Between Measures of Medical School Performance
(N=754)

	1	2	3
1. GPA first 2 years medical school	---		
2. GPA last 2 years medical school	.54	---	
3. GPA all 4 years medical school	.63*	.93*	---

*These two correlations are part-whole correlations.

Results. As described in the Item Analysis section of Chapter III, both initial validities and cross-validities were computed for the item alternatives of the BIM throughout this research when samples of sufficient size were available. Since an adequate-sized sample existed in the present study this procedure was followed. In both validity cases, item alternatives were retained and keyed if they had a biserial correlation of at least .15 with the criterion being predicted and at least 15 per cent of the subjects responded to the item alternatives.

Table III presents the resultant concurrent validities for the BIM scores and the three criteria of medical school performance. It is noted that these correlations ranged

Table III
Concurrent Validities Between BIM Scores and
Medical School Performance*
(N=754)

BIM Scores	Medical School Grade-Point-Averages		
	First 2 yrs.	Last 2 yrs.	All 4 yrs.
Parents, Home, School Life	.39	.25	.28
College Life	.25	.18	.22
Adult Life	.27	.24	.19
Professional Life	.27	.37	.37
Total Score	.49	.49	.49

*A new empirical BIM key was built for each of the three medical school GPA measures.

from .18 to .49. In comparison with previous research by Taylor & Ellison (1963, 1964), such initial validities are quite low and suggest that at least some of them could drop to insignificant levels upon cross-validation. Table IV shows this to be true. Specifically, it shows that the cross-validities for the BIM dropped to the zero-order level. Moreover, Table IV also indicates that the predictive validities for the MCAT scores and Premedical GPA were of comparable zero-order magnitudes.[10]

Table IV
Validity Coefficients for Predictors of
Medical School Performance*

Predictors		Medical School GPA Criteria		
		First 2 yrs.	Last 2 yrs.	All 4 yrs.
Premedical GPA		.06	.08	.09
MCAT Scores	Verbal	.10	-.13	-.09
	Quantitative	.09	-.14	.10
	Social	.10	-.13	-.09
	Science	.10	-.13	-.09
BIM Scores	Parents, Home, School Life	.03	-.12	-.15
	College Life	-.03	.01	.05
	Adult Life	.10	.01	-.05
	Professional Life	-.09	.05	.07
	Total Score	-.02	-.04	-.06

*The reported validity coefficients for the Premedical School GPA and MCAT scores are predictive validities (N=754); the correlations for the BIM scores are concurrent cross-validities of one of the samples (N=377 for both cross-validation samples). Also, a new BIM empirical key was built for each of the three medical school GPA criteria.

Discussion and Summary. In essence, then, the findings of this study strongly suggest that the search for adequate predictors of medical school achievement is far from being exhausted. The results obtained here on the predictive efficiency of the Premedical GPA and the MCAT generally agree with the accumulating body of evidence which shows considerable improvement is needed before these two predictors can be considered to be very worthwhile forecasters of medical school performance. The disappointing results that were obtained with the BIM were not altogether unexpected. It will be recalled that in Chapter III where the development of the BIM was described, the BIM items were deliberately collected and constructed with the prediction of on-the-job performance in mind. Therefore, to be successful with this type of predictor it may well be that items will have to be constructed with the prediction of medical school performance, rather than job performance, as the point of emphasis. In any event, the general failure of all of the predictors strongly emphasizes the need for vigorous research with other new measures and predictors of medical school performance.

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[10] Admittedly, there is some restriction of range in these Premedical GPA and MCAT validities. However, statistical corrections for such restriction of range would still yield quite low validities against the GPA for the first two years of medical school and predominantly negative validities against the GPA for the last two years and against the GPA for all four years of medical school.

Of course, it is conceivable that their three measures actually predict valuable abilities, talents, or characteristics that are necessary in medical school performance but which are not measured by medical school grades. In this case, the problem becomes one of finding measures of medical school achievement that encompass areas other than those covered by conventional GPA's. Naturally, this leads to a plea for more research on the academic criterion area, i.e., medical school achievement. Supporting, this is the finding (see Table II) that medical school grades are rather highly intercorrelated. This is somewhat contrary to the observation that the medical school curriculum changes considerably from the first to the fourth year of training. It is expected that with such changes, concurrent changes should occur in the abilities required for satisfactory achievement. Perhaps, then, what is consistently and reliably measured by the official grades in medical school is only a narrow band of the broad spectrum of mental and psychological abilities actually called forth by the usual four years of medical school.

Although the validity coefficients reported in Table IV were all of an essentially zero-order magnitude, a trend in the MCAT scores is worth noting. A glance at this table shows consistent positive correlations between the four MCAT scores and GPA for the first two years of medical school, and then consistently negative correlations with GPA for the last two years of medical school. This finding essentially agrees with those of Richards, Taylor, & Price (1961, 1962). Thus, if this trend is reliable and valid, it would appear that the MCAT should be restricted to predicting initial, rather than terminal, medical school performance. Of course, such a restriction would complicate the use of the MCAT in the overall selection program in which students are admitted for all four years and, in effect, for the profession of medicine.

In view of the consistently low validity coefficients of the MCAT against the GPA measures of medical school achievement, brief consideration should be given to the argument that the MCAT measures are quite "restricted in range" and if this restriction were suddenly removed, the intercorrelations would appreciably increase. By and large, the authors tend to disagree with this rationalization. For one, correction formulas for direct restriction of range are not highly corrective for such zero-order correlations as obtained in this study. In other words, until the correlations reach the .20's and .30's restriction of range formulas will usually not appreciably change the obtained correlations. For another, it is noted that all four MCAT scores correlated negatively with GPA for the last two years of medical school. Thus, if restriction of range were removed many of these negative correlations would become even more negative. If this occurred, the MCAT would tend to isolate those who would perform poorly in the last two years of medical school, rather than those who would perform well. This becomes particularly damaging to the MCAT scores as predictors when one considers that medical training becomes more important, in terms of on-the-job performance in the later, more advanced years of training.[11]

Table IV also shows that Premedical GPA correlated low but positively with all three measures of medical school achievement studied in this chapter. This appears to be consistent with the current trend in research findings on this predictor. Specifically, recent research shows the Premedical GPA has some promise, though limited to be sure, for predicting medical school GPA (Hill, 1959; Schwartzman, Hunter & Lohrenz, 1962; Gaier, 1952; Price, Taylor, Richards, & Jacobsen, 1963; Richards, Taylor, Price, & Jacobsen, 1964).

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[11] Other arguments on this point are presented in the 1963 study (Price, Taylor, Richards, & Jacobsen, 1963, pp. 105-112). See also Meredith (1958).

Chapter V

Predictors of Professional Performance of Full-Time Medical School Faculty Members

As emphasized in the review of Chapter I, few studies have been conducted in which the predictive efficiency of medical school selection devices have been tested against any "ultimate" criterion of on-the-job professional performance. This is true despite the fact that almost every reporting of research on selection measures has called attention to this need. The usual rationalization for this omission is couched in such terms as the inherent difficulty and complexity involved in the dimensions and correlates of professional performance, accomplishments, and contributions of the practicing physician. Undoubtedly, such a view is realistic. However, it should be viewed as a challenge, rather than an insurmountable obstacle to be skirted by relying entirely on more accessible, intermediate criterion, such as medical school grades or internship, and residency performance. Fully aware of the difficulties involved, but also deeply interested in the challenge of "cracking" the criterion problem in medicine, the present authors conducted a lengthy study in which an attempt was made to discover and develop a first set of measures of physician performance (Price et al., 1963, 1964, 1965; Taylor et al., 1965; Richards et al., 1964). From this study involving some 500 Utah physicians, criterion measures were developed for three different types of medical practice: full-time medical faculty members, board-qualified specialists, and general practitioners. Admittedly, these measures of on-the-job performance are highly exploratory and only represent a first effort with its inherent limitations. However, they provide for the first time a set of dimensions against which educators can get some tentative indications of the predictive efficiency of medical school selection devices. Accordingly, in this and the following chapters research findings are presented in which some medical school selection devices are validated against these criterion measures. In the present chapter, emphasis is given to an evaluation of these measures in predicting professional performance in a medical faculty setting.

Subjects. The population from which the present sample was drawn consisted of the members of the full-time faculty of the University of Utah College of Medicine who have earned a doctoral degree (M.D. or Ph.D. or both) (N=118) and those graduates of the University of Utah College of Medicine who hold full-time faculty appointments outside of Utah (N=20). From this population of 138 physicians in academic medicine, 61 (44 per cent) were studied in detail and comprised the present sample. Thirteen of these physicians came from the out-of-state group.

Predictors. In order for a physician to practice academic medicine, he must, among other things, survive the ongoing "weeding-out" process of both medical school selection and medical school training. In surviving these two hurdles, he must attain at least a minimal level of achievement throughout the four years of medical education. The assumption implied that performance on both of these "tests" is somehow positively related to later professional performance in academic medicine. If this is true, measures of these performances could then be viewed as predictors of later on-the-job performance in academic medicine. Accordingly, in this and the next two chapters both medical school selection devices and measures of medical school achievement were treated as predictors of on-the-job performance.

In the present chapter, the predictors were the Premedical GPA, the GPA for All Four Years of Medical School, and the five scores of the BIM (Parents, Home, and School Life, College Life, Adult Life, Professional Life, and Total Score).[12] Tests for the significance of the difference between the means of the 48 participants who were on the faculty of the College of Medicine of the University of Utah and the 13 participants who were full-time faculty members of other colleges of medicine on these predictors failed to show any significant differences. The Premedical GPA was found to correlate .34 with GPA for All Four Years of Medical School.

Criteria. In the introduction of this chapter it was indicated that the authors had completed a study in which measures were developed for assessing the on-the-job performance of physicians in various types of medical practice. One type of practice that the study encompassed was that of academic medicine. In that study, 80 criterion measures were obtained from 102 full-time academicians of the College of Medicine of the University of Utah. These measures were then intercorrelated and factor analyzed by the principal component method and rotated to a final solution by the varimax analytic orthogonal rotational solution (Harmon, 1960; Kaiser, 1960). This analysis resulted in 25 "factors" or independent dimensions of on-the-job performance.

In the present study, this same procedure was repeated. The 80 criterion measures were already available on the 48 Utah subjects; with the 13 out-of-state subjects these criterion data were collected by mail (see Figure I herein for a listing of the titles and sources of these 80 criterion measures and see Appendix C of the 1963 final report for a detailed description of the scoring system for these measures).[13] Computed t-tests between the 48 Utah and 13 non-Utah physicians on the 64 of the 80 criterion variables on which data were available for both groups showed that the groups differed significantly on 22 of the variables (see Table V).[14] This would seem to suggest that the two groups should not be pooled for the present study. However, when the criterion data of the 61 participating subjects was intercorrelated and factor analyzed and then compared to the previous factor analysis of the Utah group of 102 full-time academicians (Price, Taylor, Richards, & Jacobsen, 1963), the resultant coefficients of congruency between the factors were all in the .80's and .90's, indicating the differences were not critical for

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[12] Scores on the MCAT were not included in this analysis because such scores were available on only 12 of the 61 subjects.

[13] The 48 Utah physicians of the present study had all participated in the previous study. A detailed summary of the procedures employed in scoring these variables is presented in Performance Measures of Physicians (Price, Taylor, Richards, & Jacobsen, 1963, pp. 117-139).

[14] On sixteen of the criterion variables it was either not possible or it was considered inappropriate to gather such data through the mail for the non-Utah faculty.

Figure I
Title and Source for Each Criterion Variable of Full-Time Faculty Sample
(N=61)

Criterion Variables*		Source	
No.	Title	Utah Faculty (N=48)	Non-Utah Faculty (N=13)
1	Present Academic Rank	Official Records	Missing Data**
2	Average Number of Medical School Committee Memberships Per Year for Last Five Years	Official Records	Missing Data
3	Total Number of Medical School Committee Memberships During Last School Year	Official Records	Missing Data
4	Average Number of Medical School Committee Chairmanships Per Year for Last Five Years	Official Records	Missing Data
5	Total Number of Medical School Committee Chairmanships During Last School Year	Official Records	Missing Data
6	Total Number of Publications in Scientific and Professional Journals During Career	Vita	Mailed Interview Form
7	Average Number of Journal Publications Per Year Since Receiving M.D. or Ph.D.	Vita	Mailed Interview Form
8	Average Career Level of Contribution to Publications as Indicated by Senior vs. Junior Authorship Status	Vita	Missing Data
9	Promotion Rate in College of Medicine	Vita	Missing Data
10	Total Number of Professional Positions Since Receiving M.D. or Ph.D.	Vita	Mailed Interview Form
11	Mobility Rate in Professional Positions Since Receiving M.D. or Ph.D.	Vita	Mailed Interview Form
12	Total Number of Hospitals Employed in During Residency	Vita	Mailed Interview Form
13	Total Number of Years Spent in Residency	Vita	Mailed Interview Form
14	Number of American Board Specialty Certifications	Vita	Mailed Interview Form
15	Average Quality of Specialty Certifications	Vita & Expert Judges	Mailed Interview Form & Expert Judges
16	Total Number of Listings in Honorary Compendiums	Compendiums	Compendiums
17	Number of Times Nominated as Outstanding Contributor by Colleagues in College of Medicine	Colleagues	Missing Data
18	Number of Times Nominated as Outstanding Teacher by Medical Students	Medical Students	Missing Data
19	Department Head's Rating of "Clinical Excellence"	Deaprtment Head	Missing Data
20	Number of Current Memberships in Scientific and Professional Societies	Personal Interview	Mailed Interview Form
21	Average Judged Quality of Societies in Which Membership is Current	Personal Interview & Expert Judges	Mailed Interview Form & Expert Judges
22	Net Income from Medical Profession	Personal Interview	Mailed Interview Form
23	Self-Reported Number of Research Contributions Made to Medicine	Personal Interview	Mailed Interview Form
24	Average Judged Quality of Self-Reported Research Contributions	Personal Interview & Expert Judges	Missing Data
25	Self-Reported Number of Non-Medical Contributions to Society	Personal Interview	Mailed Interview Form
26	Total Number of Current Research Grants	Personal Interview	Mailed Interview Form
27	Average Amount of Current Research Grants	Personal Interview	Mailed Interview Form
28	Total Number of Research Grants Received During Career	Personal Interview	Mailed Interview Form
29	Total Number of Publications in Last Two Years	Personal Interview	Mailed Interview Form
30	Self-Estimated Number of Publications in Next Two Years	Personal Interview	Mailed Interview Form
31	Self-Estimated Comprehensiveness of Publications in Next Two Years	Personal Interview	Mailed Interview Form
32	Total Number of Papers Presented at Scientific and Professional Meetings During Career	Personal Interview	Mailed Interview Form
33	Average Number of Speeches to Laymen Groups Per Year	Personal Interview	Mailed Interview Form
34	Number of Times Research Has Been Reported in Mass Media During Career	Personal Interview	Mailed Interview Form
35	Average Number of Hours Per Week Spent in Clinical Teaching of Medical Students	Personal Interview	Mailed Interview Form
36	Average Number of Formal Medical Consultations Called Into Annually	Personal Interview	Missing Data
37	Average Number of Informal Medical Consultations Called Into Annually	Personal Interview	Mailed Interview Form
38	Average Number of Society Meetings Attended Annually	Personal Interview	Missing Data
39	Number of Current Memberships in Civic and Political Organizations	Personal Interview	Missing Data
40	Number of Offices Held in Civic and Political Organizations	Personal Interview	Mailed Interview Form
41	Total Number of Scientific and Professional Awards Received During Career	Personal Interview	Mailed Interview Form
42	Average Judged Quality of Awards Received	Personal Interview & Expert Judges	Missing Data
43	Number of Subscriptions to Scientific and Professional Journals	Personal Interview	Mailed Interview Form
44	Number of Scientific and Professional Journals Reviewed Regularly	Personal Interview	Mailed Interview Form
45	Number of Articles in Scientific and Professional Journals Read in Detail Each Month	Personal Interview	Mailed Interview Form
46	Number of Techniques Other Than Journals and Meetings Used in Keeping Abreast of Field	Personal Interview	Mailed Interview Form
47	Total Number of Offices Held in Scientific and Professional Societies During Career	Personal Interview	Mailed Interview Form
48	Number of Times During Career Invited to Serve as Editor of Scientific or Professional Journal	Personal Interview	Mailed Interview Form
49	Number of Acceptances of Invitations to Serve as Editor	Personal Interview	Mailed Interview Form
50	Number of Courses in College of Medicine for Which Faculty Member is Primarily Responsible	Personal Interview	Missing Data
51	Number of Courses in College of Medicine for Which Faculty Member is a Supplementary Instructor	Personal Interview	Mailed Interview Form
52	Number of Times During Career Invited to Serve on Scientific and Professional Advisory Boards	Personal Interview	Missing Data
53	Number of Acceptances of Invitations to Serve on Advisory Boards	Personal Interview	Mailed Interview Form
54	Number of Current Memberships in Social and Avocational Organizations	Personal Interview	Missing Data
55	Number of Offices Held in Social and Avocational Organizations	Personal Interview	Mailed Interview Form
56	Total Number of Fellowships Received	Personal Interview	Mailed Interview Form
57	Average Number of Formal Research Consultations Called Into Annually	Personal Interview	Mailed Interview Form
58	Average Number of Informal Research Consultations Called Into Annually	Personal Interview	Mailed Interview Form
59	Self-Rated Liking for Actual Practice of Profession	Questionnaire	Questionnaire
60	Self-Rated Liking for Teaching	Questionnaire	Questionnaire
61	Self-Rated Liking for Research	Questionnaire	Questionnaire
62	Self-Rated Liking for Studying and Reading Professional Literature	Questionnaire	Questionnaire
63	Self-Rated Liking for Professional Consulting	Questionnaire	Questionnaire
64	Self-Rated Liking for Participation in Professional Societies	Questionnaire	Questionnaire
65	Self-Rated Liking for Writing for Professional Literature	Questionnaire	Questionnaire
66	Self-Rated Liking for Professional Administrative Activities	Questionnaire	Questionnaire
67	Self-Rated Liking for Miscellaneous Professional Activities	Questionnaire	Questionnaire
68	Overall Occupational Satisfaction	Questionnaire	Questionnaire
69	Rating of Overall Performance Based on All of Above Information	Expert Judges	Missing Data
70	Interviewer Rating of Cooperation	Project Interviewer	Missing Data
71	Interviewer Rating of Likeability	Project Interviewer	Missing Data
72	Extent to Which Willingly Met Participation Requirement on This Project	Project Records	Project Records
73	Undergraduate Grade Point Average	Official Transcripts	Official Transcripts
74	Medical or Graduate School Grade Point Average	Official Transcripts	Official Transcripts
75	Age at Which Received M.D. or Ph.D.	Personal Interview & Compendiums	Mailed Interview Form & Compendiums
76	Years of Experience Since Receiving M.D. or Ph.D.	Personal Interview & Compendiums	Mailed Interview Form & Compendiums
77	Total Number of Undergraduate and Graduate Degrees	Personal Interview & Compendiums	Mailed Interview Form & Compendiums
78	Age	Personal Interview	Mailed Interview Form
79	Academic Appointment Rather Than Research	Personal Interview & Compendiums	Mailed Interview Form & Compendiums
80	M.D. Degree Rather than Ph.D.	Personal Interview & Compendiums	Mailed Interview Form & Compendiums

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*A detailed summary of the procedures employed in scoring these variables is presented in Performance Measures of Physicians (Price, Taylor, Richards, & Jacobsen, 1963, pp. 117-139).

**On the "Missing Data" variables it was either not possible or it was considered inappropriate to gather such data through the mail for the non-Utah faculty.

Table V
Tests for Significance of Difference Between Means of Utah
Faculty Members (N=48) and Non-Utah Faculty Members (N=13) on
Criterion Variables

Criterion Variables		t*
No.	Title	
1	Present Academic Rank	**
2	Average Number of Medical School Committee Memberships Per Year for Last Five Years	**
3	Total Number of Medical School Committee Memberships During Last School Year	**
4	Average Number of Medical School Committee Chairmanships Per Year for Last Five Years	**
5	Total Number of Medical School Committee Chairmanships During Last School Year	**
6	Total Number of Publications in Scientific and Professional Journals During Career	1.63
7	Average Number of Journal Publications Per Year Since Receiving M.D. or Ph.D.	2.96***
8	Average Career Level of Contribution to Publications as Indicated by Senior vs. Junior Authorship Status	**
9	Promotion Rate in College of Medicine	**
10	Total Number of Professional Positions Since Receiving M.D. or Ph.D.	0.47
11	Mobility Rate in Professional Positions Since Receiving M.D. or Ph.D.	1.82
12	Total Number of Hospitals Employed in During Residency	5.02***
13	Total Number of Years Spent in Residency	0.89
14	Number of American Board Specialty Certifications	9.86***
15	Average Quality of Specialty Certifications	1.70
16	Total Number of Listings in Honorary Compendiums	1.94
17	Number of Times Nominated as Outstanding Contributor by Colleagues in College of Medicine	2.15
18	Number of Times Nominated as Outstanding Teacher by Medical Students	5.04***
19	Department Head's Rating of "Clinical Excellence"	6.48***
20	Number of Current Memberships in Scientific and Professional Societies	3.27***
21	Average Judged Quality of Societies in Which Membership is Current	2.10
22	Net Income from Medical Profession	1.79
23	Self-Reported Number of Research Contributions Made to Medicine	1.29
24	Average Judged Quality of Self-Reported Research Contributions	**
25	Self-Reported Number of Non-Medical Contributions to Society	2.50
26	Total Number of Current Research Grants	4.70***
27	Average Amount of Current Research Grants	5.40***
28	Total Number of Research Grants Received During Career	0.30
29	Total Number of Publications in Last Two Years	4.55***
30	Self-Estimated Number of Publications in Next Two Years	2.16
31	Self-Estimated Comprehensiveness of Publications in Next Two Years	3.49***
32	Total Number of Papers Presented at Scientific and Professional Meetings During Career	0.11
33	Average Number of Speeches to Laymen Groups Per Year	1.05
34	Number of Times Research Has Been Reported in Mass Media During Career	0.42
35	Average Number of Hours Per Week Spent in Clinical Teaching of Medical Students	8.02***
36	Average Number of Formal Medical Consultations Called Into Annually	**
37	Average Number of Informal Medical Consultations Called Into Annually	0.54
38	Average Number of Society Meetings Attended Annually	**
39	Number of Current Memberships in Civic and Political Organizations	**
40	Number of Offices Held in Civic and Political Organizations	0.31
41	Total Number of Scientific and Professional Awards Received During Career	4.79***
42	Average Judged Quality of Awards Received	**
43	Number of Subscriptions to Scientific and Professional Journals	0.39
44	Number of Scientific and Professional Journals Reviewed Regularly	2.51
45	Number of Articles in Scientific and Professional Journals Read in Detail Each Month	0.45
46	Number of Techniques Other Than Journals and Meetings Used in Keeping Abreast of Field	0.86
47	Total Number of Offices Held in Scientific and Professional Societies During Career	0.20
48	Number of Times During Career Invited to Serve as Editor of Scientific or Professional Journal	0.71
49	Number of Acceptances of Invitations to Serve as Editor	0.89
50	Number of Courses in College of Medicine for Which Faculty Member is Primarily Responsible	**
51	Number of Courses in College of Medicine for Which Faculty Member is a Supplementary Instructor	2.39
52	Number of Times During Career Invited to Serve on Scientific and Professional Advisory Boards	**
53	Number of Acceptances of Invitations to Serve on Advisory Boards	1.11
54	Number of Current Memberships in Social and Avocational Organizations	**
55	Number of Offices Held in Social and Avocational Organizations	1.35
56	Total Number of Fellowships Received	2.37
57	Average Number of Formal Research Consultations Called Into Annually	0.61
58	Average Number of Informal Research Consultations Called Into Annually	2.78***
59	Self-Rated Liking for Actual Practice of Profession	0.49
60	Self-Rated Liking for Teaching	0.45
61	Self-Rated Liking for Research	0.99
62	Self-Rated Liking for Studying and Reading Professional Literature	0.34
63	Self-Rated Liking for Professional Consulting	2.99***
64	Self-Rated Liking for Participation in Professional Societies	1.92
65	Self-Rated Liking for Writing for Professional Literature	2.66***
66	Self-Rated Liking for Professional Administrative Activities	1.25
67	Self-Rated Liking for Miscellaneous Professional Activities	6.71***
68	Overall Occupational Satisfaction	4.38***
69	Rating of Overall Performance Based on All of Above Information	**
70	Interviewer Rating of Cooperation	1.54
71	Interviewer Rating of Likeability	0.55
72	Extent to Which Willingly Met Participation Requirement on This Project	1.20
73	Undergraduate Grade Point Average	4.12***
74	Medical or Graduate School Grade Point Average	**
75	Age at Which Received M.D. or Ph.D.	9.31***
76	Years of Experience Since Receiving M.D. or Ph.D.	0.34
77	Total Number of Undergraduate and Graduate Degrees	0.74
78	Age	3.15***
79	Academic Appointment Rather Than Research	4.65***
80	M.D. Degree Rather than Ph.D.	4.04***

*Entries represent absolute differences between groups without regard to the direction of the differences.

**Criterion measures on which data for one of the groups are missing.

*** $p < .01$

the factor patterns. Moreover, the analyses of the present chapter were based on the factor analysis and not the t-tests. Thus, although certain differences do exist between these two groups, they should not greatly affect the outcome of the present study.

These factors then served as the basis for the criterion measures of the present study. Specifically, every subject of the present study received a "factor score" for each of the 25 factors. These factor scores were computed on the 1040 IBM electronic computer from Mulaik's (1964) modification of Kaiser's (1962) method of obtaining orthogonal factor scores for rotated factors. As such, the factor scores are in the form of standard scores with a mean of zero. Table VI shows the titles of these criterion factor measures and the intercorrelations of their factor scores.[15] With some exceptions, these intercorrelations tend to be low.

Results. Essentially the same procedure as that of Chapter IV was followed in this study in determining the predictive efficiency of the present predictors of performance in academic medicine. The first step was that of computing concurrent validities for each of the five BIM measures against the factor scores for each of the 25 factors.[16] As shown in Table VII these concurrent validities ranged from .51 to .92 with a mean correlation of .75. The mean correlations for the five BIM scores of Parents, Home and School Life, College Life, Adult Life, Professional Life, and Total Score were .79, .66, .77, .69, and .90 respectively. Of the 300 items comprising the final form of the BIM, an average number of 179 items was keyed or retained in the total BIM scores across the 25 criteria.

Of course, these data are based on item analyses in which the validity coefficients were computed from the same data used in the item analysis. One would expect a drop in the magnitudes of the validities if they were subjected to cross-validation (the sample is split into halves and keys built on one of the halves are used to predict the other half). Table VIII shows this to be true. Specifically, on cross-validation the validities dropped toward a more zero-order level of magnitude, with correlations ranging from -.33 to +.58, with a mean validity of .08. The average cross-validities for the BIM's subscores were .06 for the Parents, Home, and School Life score, .08 for the College Life score, .06 for the Adult Life score, .13 for the Professional Life score, and .15 for the Total Score measure. At a first overall glance, such results strongly suggest that the BIM scores should not be considered as ready for use as predictors of faculty performance in medical school.

On the other hand, a careful inspection of Table VIII also shows that the BIM does make a small, but worthwhile contribution to the prediction of certain of the present

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[15] For those interested, a description and analytical interpretation of each of the factors is given in Performance Measures of Physicians (Price, Taylor, Richards, & Jacobsen, 1963).

[16] An item alternative was keyed or accepted if 15% of the sample had responded to it and if it had a biserial correlation of at least .15 with the particular criterion against which it was being evaluated.

Table VI
Intercorrelations Between Factor Score Measures of Physician Performance: College of Medicine Faculty Sample
(N=61)

No.	Title	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
A	Academic Seniority	--																								
B	Professional Recognition for Achievements	-08	--																							
C	Keeping Up by Journal Reading	-38	28	--																						
D	Early Academic Progress and Recognition	-25	07	01	--																					
E	Contribution as Journal Editor	04	14	-09	04	--																				
F	Accomplishment in Research: Self-Rating	-04	10	05	00	-25	--																			
G	Comprehensiveness of Future Publications: Self-Rating	-11	35	09	59	03	-15	--																		
H	Research Consulting	-06	-04	-17	17	01	12	24	--																	
I	Rejection of Medicine	-13	20	60	06	-33	08	14	-47	--																
J	Prolonged Residency Training	04	-32	05	-20	-28	-04	-21	-38	40	--															
K	Level of Specialization	-05	02	-26	-05	-04	20	-12	-23	10	03	--														
L	Clinical Teaching and Consulting	30	01	-23	-11	12	-37	04	-01	-33	-18	15	--													
M	Academic Orientation--Teaching Excellence	07	19	55	-02	11	-11	10	-38	52	15	-23	-29	--												
N	Teaching Responsibilities	06	-10	-50	22	30	-16	22	35	-60	-17	-04	19	-41	--											
O	Administrative Contributions to College of Medicine	02	04	30	-36	-26	05	-39	-30	21	24	05	00	16	-44	--										
P	Professional Mobility and Advancement	-21	-01	37	-01	13	-03	-15	-25	36	-04	-28	-44	36	-42	11	--									
Q	Status-Seeking Tendencies	15	-25	-56	16	-01	05	16	34	-35	-11	42	18	-37	29	-22	-38	--								
R	Public Recognition for Accomplishments	-14	04	27	-24	-05	20	-12	-30	27	-06	03	-03	07	00	05	16	-25	--							
S	Professional Society Participation	03	-18	-43	-06	-08	-12	05	11	-25	02	09	-23	-26	25	-14	-20	09	-20	--						
T	Civic Participation	07	-08	-60	12	27	-37	23	25	-29	07	14	15	-28	50	-45	-28	58	-28	26	--					
U	Overall Occupational Satisfaction	21	12	-34	15	25	-31	-03	21	-31	-05	-14	37	-22	27	-33	-32	22	-37	-19	50	--				
V	Participation in Social Organizations	06	-09	11	-10	13	-18	-13	-28	16	13	-36	-11	21	-54	11	48	-27	-21	-22	-15	16	--			
W	Interviewer's Rating of Likeability	05	-07	16	-13	-23	19	-23	08	-07	07	-06	14	-11	-11	20	-05	-14	-16	-04	-37	-03	-07	--		
X	Project Cooperativeness	-28	11	07	32	-05	19	53	05	05	17	-14	-01	-06	13	-23	-15	04	06	-09	06	-07	-16	-01	--	
Y	Achievement in Education	21	20	26	18	06	-14	11	-39	53	05	-05	-19	33	-28	30	44	-21	18	-08	-17	-28	22	-23	-29	--

Note: Decimals have been omitted.

Table VII
Concurrent Validities Between BIM Scores and Criteria Factor Scores:
Full-Time Medical School Faculty Sample*
(N=61)

Factor Scores		BIM Scores				
No.	Title	Parents, Home, School Life	College Life	Adult Life	Professional Life	Total Score
A	Academic Seniority	79	64	77	70	86
B	Professional Recognition for Achievements	84	68	77	65	91
C	Regular Review of Scientific Literature	78	61	85	62	91
D	Early Academic Progress and Recognition	78	63	86	57	92
E	Contributions as an Editor	78	69	80	63	87
F	Self-Evaluated Accomplishment in Research	82	68	78	59	88
G	Self-Estimated Comprehensiveness of Future Publications	81	51	82	62	89
H	Research Consulting	77	67	83	61	90
I	Rejection of Actual Practice	74	72	55	80	88
J	Prolonged Residency Training--Excellence as a Clinician	79	71	71	75	87
K	Level of Medical Specialization and Attainment	78	59	73	76	88
L	Clinical Teaching and Consulting	80	71	81	87	92
M	Academic Orientation--Teaching Excellence	80	73	83	52	90
N	Teaching Responsibilities	74	70	77	69	87
O	Administrative Contributions to the College of Medicine	77	67	79	56	88
P	Rate of Professional Mobility and Advancement	77	67	81	64	91
Q	Status-Seeking Tendencies and Skills	81	69	84	65	90
R	Public Recognition for Contributions	79	56	84	58	91
S	Participation in Professional Societies	80	75	82	60	90
T	Civic Participation	83	69	80	72	91
U	Overall Occupational Satisfaction	74	65	67	79	87
V	Participation in Social Organizations	76	63	63	81	90
W	Interviewer's Rating of Likeability	79	63	71	87	91
X	Project Cooperativeness	79	69	60	85	92
Y	Achievement in Education	78	59	74	80	91

*Correlations reported are concurrent validities based on BIM keys which are not fixed for a given column or row. Instead, a new empirical key of each type was built separately for each criterion.

Note: Decimals have been omitted.

Table VIII
Validity Coefficients Between Criteria Factor Scores and Criteria Predictors:
Full-Time College of Medicine Sample
(N=61)

Factor Scores		Predictors						
		BIM*					GPA**	
No.	Title	Parents, Home, School Life	College Life	Adult Life	Professional Life	Total Score	Premedical School	Medical School
A	Academic Seniority	14	24	53	50	58	-16	-46
B	Professional Recognition for Achievements	37	-11	-16	07	07	02	-21
C	Regular Review of Scientific Literature	06	00	-05	34	24	29	02
D	Early Academic Progress and Recognition	00	12	-06	13	07	-01	04
E	Contributions as an Editor	16	25	29	51	46	-02	13
F	Self-Evaluated Accomplishment in Research	16	18	-07	04	13	-08	-02
G	Self-Estimated Comprehensiveness of Future Publications	-26	-21	-01	30	06	-05	-04
H	Research Consulting	-09	05	-06	20	12	-06	-02
I	Rejection of Actual Practice	08	20	05	41	37	24	-17
J	Prolonged Residency Training--Excellence as a Clinician	09	15	06	-17	03	-14	02
K	Level of Medical Specialization and Attainment	08	13	-03	-33	-15	-06	00
L	Clinical Teaching and Consulting	13	10	27	09	25	-02	24
M	Academic Orientation--Teaching Excellence	27	42	30	-20	27	19	35
N	Teaching Responsibilities	08	14	24	16	25	-42	-05
O	Administrative Contributions to the College of Medicine	-01	-24	-01	24	15	15	-08
P	Rate of Professional Mobility and Advancement	16	10	-03	20	20	13	12
Q	Status-Seeking Tendencies and Skills	-07	00	17	02	04	-03	-03
R	Public Recognition for Contributions	-12	-20	-22	15	-13	32	21
S	Participation in Professional Societies	-16	24	12	05	08	-23	-30
T	Civic Participation	-02	-22	36	08	08	13	-09
U	Overall Occupational Satisfaction	06	31	04	36	39	-19	09
V	Participation in Social Organizations	04	17	-05	02	09	12	32
W	Interviewer's Rating of Likeability	02	-17	00	16	05	-16	07
X	Project Cooperativeness	28	09	-30	-17	-07	40	12
Y	Achievement in Education	-07	16	14	12	14	56	51

*Correlations reported are cross-validities based on a separate empirical key for each criterion or row.

**Correlations reported are predictive validities.

Note: Decimal points are omitted.

criteria. Specifically, the following criteria were found to be predicted significantly ($p < .05$) by the following BIM scores: (1) Factor B by the Parents, Home, and School Life score, (2) Factor M by the College Life score, (3) Factors A and T by the Adult Life score, (4) Factors A, E, I, and U by the Professional Life score, and (5) Factors A, E, I, and U by the Total Score. In other words, one or more of the BIM's measures was found to correlate significantly on cross-validation with seven or 28% of the 25 criteria dimensions. This is felt to be a substantial and worthwhile contribution to the prediction of faculty performance of physicians for one of the first studies in this area.

A very similar predictive picture as that of the BIM emerges when we consider the results for the GPA measures (see the last two columns of Table VIII). In general, the two measures, Premedical GPA and Medical School GPA, correlated at a zero-order level with the criteria factor scores. In fact, the mean correlation across all 25 criteria was +.04 for the Premedical GPA and +.03 for the Medical School GPA. However, some notable single exceptions can be seen in Table VIII. Premedical GPA correlated significantly ($p < .05$) with Factors C, N, R, X, and Y. Medical School GPA, on the other hand, correlated significantly with an almost different set of criteria: Factors A, M, S, V, and Y. Thus, these two GPA measures combined successfully predicted nine or 36% of the criteria.[17] Again, this is felt to indicate that the GPA is not an all-inclusive predictor of physician performance, but that its predictive contribution is significant.[18]

Looking now at the same findings, but from a different perspective, it can be seen in Figure II that 14 of the 25 criteria dimensions were predicted by one or more of the seven predictors. Factor A was predicted by the BIM's Adult Life, Professional Life and Total Score measures and negatively by the Medical School GPA; Factor B by the BIM's Parents, Home, and School Life score; Factor C by the Premedical GPA; Factors E, I, and U by both the Professional Life and the Total Score of the BIM; Factor M by the BIM's College Life score and the Medical School GPA; Factor N negatively and Factors R and X positively by the Premedical GPA; Factor S negatively by the Medical School GPA; Factor T by the BIM's Adult Life score; Factor V by Medical School GPA; and Factor Y (spuriously, as indicated above) by both GPA measures. All totaled it could be concluded that a major, but not comprehensive, step has been made in differentially predicting on-the-job physician performance. In so doing, both the BIM and GPA measures were found to be of value, if carefully used in the areas where significant validities were found.

Discussion and Summary. Previous research by the authors on measures of the dimensions and correlates of performance in academic medicine found it to be a complex area. In other words, medical faculty members can find many outlets through which

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[17] The results on Factor Y, however, are spurious since the criterion factor of Achievement in Education is derived from academic GPA's.

[18] In comparison with the BIM results, however, one striking difference emerged: the validities of grades against three of these nine criteria were negative, a troublesome finding, indeed, when grades are officially used as if they are positively related to all of the criteria.

Figure II
Statistically Successful Predictors of Criteria:
Full-Time College of Medicine Sample

Criterion Factors		Predictors						
		BIM					GPA	
No.	Title	Parents, Home School Life	College Life	Adult Life	Prof Life	Total Score	Premed. School	Med. School
A	Academic Seniority			+	+	+		-
B	Professional Recognition for Achievements	+						
C	Regular Review of Scientific Literature						+	
D	Early Academic Progress and Recognition							
E	Contributions as an Editor				+	+		
F	Self-Evaluated Accomplishment in Research							
G	Self-Estimated Comprehensiveness of Future Publications							
H	Research Consulting							
I	Rejection of Actual Practice				+	+		
J	Prolonged Residency Training--Excellence as a Clinician							
K	Level of Medical Specialization and Attainment							
L	Clinical Teaching and Consulting							
M	Academic Orientation--Teaching Excellence		+					+
N	Teaching Responsibilities						-	
O	Administrative Contributions to the College of Medicine							
P	Rate of Professional Mobility and Advancement							
Q	Status-Seeking Tendencies and Skills							
R	Public Recognition for Contributions						+	
S	Participation in Professional Societies							-
T	Civic Participation			+				
U	Overall Occupational Satisfaction				+	+		
V	Participation in Social Organizations							+
W	Interviewer's Rating of Likeability							
X	Project Cooperativeness						+	
Y	Achievement in Education						+	+

they can expend their energies and achieve recognition. Accordingly, it should follow that attempts to predict such performances must also be complex. Therefore, it is unreasonable to expect a single measure, such as the medical school grade-point-average, to predict adequately all of the many dimensions of on-the-job performance in academic medicine. On the contrary, it is conceivable that a battery of empirically evaluated and developed "batteries of scores" should be employed, each designed to predict only one or a few of the numerous performance dimensions.

The present research results lend support to this thesis. In this effort, an extensive Biographical Inventory for Medicine and both premedical and medical school grade-point-averages were analyzed in terms of their predictive efficiency for 25 measures of on-the-job physician performance in a medical school faculty setting. Overall, it was found that none of the predictors could forecast all of the criteria dimensions. On the other hand, each of them successfully predicted a few of the criteria, and, collectively, one or more of them successfully predicted over 50% of the criteria. For a first attempt in this complex domain, such results are believed to be illuminating and encouraging. They strongly imply that performance in a college of medicine faculty can be predicted, even though considerable variance in each predicted criterion is still to be accounted for. However, with over 40% of the criteria still not predicted to any significant degree the results also strongly suggest that the search for adequate predictors is far from being exhausted. More intensive research is needed with new and different predictor measures which will fill these gaps.

Chapter VI

Predictors of Professional Performance in General Practice

During the last thirty years there has been a marked decrease in the number and a general decline in the status of the general practitioner (Peterson, 1963). In 1931 84 per cent of the practicing physicians were in general practice; in 1963 the number had shrunk to less than 50 per cent. Despite this trend, it is felt that the general practitioner does and will continue to play a vital role in the practice of medicine. Such trends often seem to follow the "pendellum effect" and once the role of specialty practice is firmly established perhaps a swing back toward increased general practice can be anticipated. Also, the quality of medical care provided by the general practitioner need not be inferior. Peterson et al. (1956), for example, found that the better general practitioners performed at a level that would have been acceptable in an outpatient clinic of a university hospital. Most important, though, is the general practitioner's unique position of being able to provide the patient with the continuity and discriminating guidance to the increasingly confusing multiplicity of specialist services that lie beyond the scope and judgment of the patient. In the light of such considerations and realizing that between 40 and 50 per cent of the nation's doctors are still general practitioners, it certainly seems appropriate, as with Faculty and Specialist groups, to investigate the prognostic value of medical school selection and evaluation devices for clinical excellence on the job. In the present chapter, an effort is described whereby the predictive effectiveness of some of the commonly employed selection and evaluation tools of our nation's medical schools are investigated.

Subjects. The population from which the present sample was drawn consisted of the 398 physicians in the state of Utah who are practicing full-time general medicine and the approximately 100 alumni of the College of Medicine of the University of Utah who reside outside of Utah and who are also full-time general practitioners. From this population of approximately 400 general practitioners 242 or about 60% were studied in detail and comprised the present sample. Of these, 34 were out-of-state alumni of the University of Utah.

Predictors. In the present study, the same twelve predictors as those of Chapters IV and V were studied: (1) Premedical GPA, (2) GPA for the first two years of medical school, (3) GPA for the last two years of medical school, the (4) Verbal, (5) Quantitative, (6) Social, and (7) Science scores of the MCAT, and the (8) Parents, Home, and School Life, (9) College Life, (10) Adult Life, (11) Professional Life, and (12) Total Score measures of the BIM. The data on these indices were collected in the same manner as described in Chapter IV. Computed t-tests between the 34 out-of-state subjects and the 208 Utah subjects on these twelve predictors failed to uncover any statistically significant differences.

The intercorrelations between the three GPA measures and the four MCAT scores are presented in Table IX. This table shows essentially the same relationships between the GPA predictors as found in the Full-time Faculty and Specialist studies: (1) the Premedical GPA measure correlated quite high, .62, with GPA for the first two years of medical school, (2) Premedical GPA correlated much lower, .29, with GPA for the last two years of medical school, and (3) GPA's for the first two years of medical school and the last two years of medical school intercorrelated .73. Again, these findings suggest a trend of diminishing returns for the Premedical GPA and of considerable stability in GPA's during medical school. Also, as could be expected from the review of Chapter I the MCAT scores were found to be moderately related (in fact, more so than often found), to GPA for the first two years of medical school but generally lowly related to Premedical GPA and GPA for the last two years of medical school. Finally, Table IX shows the four MCAT scores are quite highly intercorrelated.

Table IX
Intercorrelations Between Predictors of Physician Performance
General Practitioner Sample*
(N=242)

	1	2	3	4	5	6
1. GPA: Premedical School	---					
2. GPA: First 2 Yrs. Med. Sch.	.62	---				
3. GPA: Last 2 Yrs. Med. Sch.	.29	.73	---			
4. MCAT: Verbal	.30	.31	.13	---		
5. MCAT: Quantitative	.17	.35	.15	.58	---	
6. MCAT: Social	.11	.33	.18	.75	.57	---
7. MCAT: Science	.03	.40	.15	.57	.46	.58

*It is noted that the intercorrelations of the BIM scores with the GPA and the MCAT scores are omitted. Since the item analysis procedure for the BIM would result in keying different items for the different criteria, such intercorrelations would be vast in number and were not computed.

Criteria. As with the Full-time Faculty study and the Specialist study, 80 criterion measures were obtained on each of the participating 242 general practitioners. For the 208 Utah general practitioners the criterion data were collected in a personal interview by a member of the project staff. With the 34 out-of-state general practitioners these criterion data were collected entirely by mail with a revised form of the interview blank which was designed to gather the same data as that obtained through the personal interview. A detailed summary of these data is presented in Figure III. The results of computed t-tests between the scores obtained by the Utah and the non-Utah participants on these measures are presented in Table X. It shows 41 of the t-tests yielded t-values that are statistically significant, thus leading one to conclude the two subsamples were drawn from

Figure III
Title and Source for Each Criterion Variable for General Practitioner Sample
(N=242)

Criterion Variables*		Source	
No.	Title	Utah G. P.'s (N=200)	Non-Utah G. P.'s (N=42)
1	Number of Nominations as Preferred Consultant by General Practitioner Colleagues	Colleagues	Missing Data**
2	Number of Different Internship and Residency Hospitals	Personal Interview	Mailed Interview Form
3	Number of Years Spent in Internship and Residency	Personal Interview	Mailed Interview Form
4	Mobility Rate in Professional Positions Since Receiving M.D.	Personal Interview	Mailed Interview Form
5	Total Number of Listings in Honorary Compendiums	Compendiums	Missing Data
6	Gross Income from Medical Profession	Personal Interview	Mailed Interview Form
7	Number of Current Memberships in Scientific and Professional Societies	Personal Interview	Mailed Interview Form
8	Average Judged Quality of Societies in Which Membership is Current	Personal Interview & Expert Judges	Missing Data
9	Overall Occupational Satisfaction	Questionnaire	Questionnaire
10	Self-Reported Number of Contributions Made to Medicine	Personal Interview	Mailed Interview Form
11	Average Judged Quality of Self-Reported Contributions Made to Medicine	Personal Interview & Expert Judges	Mailed Interview Form & Expert Judges
12	Self-Reported Number of Non-Medical Contributions to Society	Personal Interview	Mailed Interview Form
13	Total Number of Papers Presented at Scientific and Professional Meetings During Career	Personal Interview	Mailed Interview Form
14	Total Number of Publications	Personal Interview	Mailed Interview Form
15	Level of Participation in Medical Research	Personal Interview	Mailed Interview Form
16	Number of Scientific and Professional Journals Reviewed Regularly	Personal Interview	Mailed Interview Form
17	Number of Subscriptions to Scientific and Professional Journals	Personal Interview	Mailed Interview Form
18	Number of Articles in Scientific and Professional Journals Read in Detail Each Month	Personal Interview	Mailed Interview Form
19	Average Number of National and Regional Society Meetings Attended Annually	Personal Interview	Mailed Interview Form
20	Average Number of State, County, and City Society Meetings Attended Annually	Personal Interview	Mailed Interview Form
21	Total Number of Offices Held in Scientific and Professional Societies During Career	Personal Interview	Mailed Interview Form
22	Number of Postgraduate Courses Taken During Career	Personal Interview	Mailed Interview Form
23	Number of Refresher Courses Taken During Career	Personal Interview	Mailed Interview Form
24	Number of Scientific and Professional Society Courses Taken During Career	Personal Interview	Mailed Interview Form
25	Physician's Evaluation of Usefulness of Drug Detail Men	Personal Interview	Mailed Interview Form
26	Extent of Physician's Experimental Use of Drugs Provided by Drug Detail Men	Personal Interview	Mailed Interview Form
27	Number of Techniques Other Than Journals, Meetings, and Drug Detail Men Used in Keeping Abreast	Personal Interview	Mailed Interview Form
28	Percentage of Patients on Which Consultations are Requested	Personal Interview	Missing Data
29	Average Number of Patients Referred to Colleagues Per Month	Personal Interview	Mailed Interview Form
30	Average Number of Patients Referred to Physician Per Month	Personal Interview	Mailed Interview Form
31	Number of Patients Scheduled Per Hour	Personal Interview	Mailed Interview Form
32	Proportion of Working Time Spent with Patients	Personal Interview	Mailed Interview Form
33	Proportion of Patients Requiring Excessive Time to Explain Diagnosis	Personal Interview	Mailed Interview Form
34	Proportion of Patients Requiring Laboratory Work	Personal Interview	Mailed Interview Form
35	Proportion of Patients Requiring Laboratory Work Outside Physician's Office Building	Personal Interview	Mailed Interview Form
36	Laboratory Facilities Within Physician's Office Building or Not	Personal Interview	Mailed Interview Form
37	Proportion of Office Patients Treated Without Charge	Personal Interview	Mailed Interview Form
38	Proportion of Office Patients Treated at a Reduced Rate	Personal Interview	Mailed Interview Form
39	Average Number of Hours Per Week Spent in Treating Charity Patients Outside Office	Personal Interview	Mailed Interview Form
40	Self-Estimated Average Socioeconomic Level of Patients	Personal Interview	Mailed Interview Form
41	Degree to Which Physician Adheres to Patient Appointment Schedule	Personal Interview	Mailed Interview Form
42	Average Number of House Calls Made Per Week	Personal Interview	Mailed Interview Form
43	Average Number of Emergency Office or Hospital Calls Made Per Week	Personal Interview	Mailed Interview Form
44	Degree to Which Physician Considered Psychological Factors in Diagnoses	Personal Interview	Mailed Interview Form
45	Average Number of Hours Per Week Devoted to Medical Practice	Personal Interview	Mailed Interview Form
46	Average Number of Hospitalized Patients	Personal Interview	Mailed Interview Form
47	Number of Hospitals in Which Physician Works	Personal Interview	Mailed Interview Form
48	Average Judged Quality of Hospitals in Which Physician Works	Personal Interview & Expert Judges	Missing Data
49	Number of Hospitals in Which Physician Maintains Courtesy Privileges	Personal Interview	Mailed Interview Form
50	Average Judged Quality of Hospitals in Which Physician Maintains Courtesy Privileges	Personal Interview & Expert Judges	Missing Data
51	Number of Formal Responsibilities Physician Has in Hospitals	Personal Interview	Mailed Interview Form
52	Self-Estimated Value of Office Equipment	Personal Interview	Mailed Interview Form
53	Number of Nurses on Physician's Ancillary Staff	Personal Interview	Mailed Interview Form
54	Number of Clerical, Administrative, and Janitorial Workers on Physician's Ancillary Staff	Personal Interview	Mailed Interview Form
55	Extent to Which Physician Limits Size of Practice	Personal Interview	Mailed Interview Form
56	Self-Reported Satisfaction with Size of Practice	Personal Interview	Mailed Interview Form
57	Amount of Malpractice Insurance Carried	Personal Interview	Mailed Interview Form
58	Average Number of Speeches on Medical Topics to Laymen Groups Per Year	Personal Interview	Mailed Interview Form
59	Average Number of Speeches on Non-Medical Topics to Laymen Groups Per Year	Personal Interview	Mailed Interview Form
60	Average Amount of Vacation Taken Annually	Personal Interview	Mailed Interview Form
61	Extent to Which Physician Plans and Maintains Leisure Time Activities	Personal Interview	Mailed Interview Form
62	Number of Current Memberships in Social and Avocational Organizations	Personal Interview	Mailed Interview Form
63	Number of Offices Held in Social and Avocational Organizations	Personal Interview	Mailed Interview Form
64	Number of Current Memberships in Civic and Political Organizations	Personal Interview	Mailed Interview Form
65	Number of Offices Held in Civic and Political Organizations	Personal Interview	Missing Data
66	Number of Church Activities in Which Physician Engages	Personal Interview	Mailed Interview Form
67	Characteristics Physician Considers Important for Success in Medicine: Number of "Common" Responses	Personal Interview	Mailed Interview Form
68	Characteristics Physician Considers Important for Success in Medicine: Number of "Uncommon" Responses	Personal Interview	Mailed Interview Form
69	Characteristics Physician Considers Important for Success in Medicine: "Commonness" of Responses Elicited	Personal Interview	Mailed Interview Form
70	Self-Rating of Success in Medicine	Personal Interview	Missing Data
71	Interviewer Rating of Condition of Physician's Office	Personal Interview	Missing Data
72	Interviewer Rating of Likeability	Personal Interview	Missing Data
73	Interviewer Rating of Physician's Involvement in This Project	Personal Interview	Missing Data
74	Age at Which Received M.D.	Personal Interview & Compendiums	Mailed Interview Form & Compendiums
75	Years of Experience Since Receiving M.D.	Personal Interview & Compendiums	Mailed Interview Form & Compendiums
76	Individual Practice Rather Than Group, Clinic or Hospital Practice	Personal Interview	Mailed Interview Form
77	General Practice with Speciality Rather Than General Practice Without Specialty	Personal Interview	Mailed Interview Form
78	Undergraduate Grade Point Average	Official Transcripts	Official Transcripts
79	Grade Point Average for First Two Years of Medical School	Official Transcripts	Official Transcripts
80	Grade Point Average for Last Two Years of Medical School	Official Transcripts	Official Transcripts

*A detailed summary of the procedures employed in scoring these variables is presented in Performance Measures of Physicians (Price, Taylor, Richards, & Jacobsen, 1963, pp. 163-186).

**On these "Missing Data" variables it was either not possible or it was considered inappropriate to gather such data through the mail.

Table X
Tests for Significance of Difference Between Means of Utah General Practitioners (N=208) and Non-Utah General Practitioners (N=34) on Criterion Variables

Criterion Variables		t*
No.	Title	
1	Number of Nominations as Preferred Consultant by General Practitioner Colleagues	**
2	Number of Different Internship and Residency Hospitals	5.20***
3	Number of Years Spent in Internship and Residency	1.59
4	Mobility Rate in Professional Positions Since Receiving M.D.	4.83***
5	Total Number of Listings in Honorary Compendiums	**
6	Gross Income from Medical Profession	9.68***
7	Number of Current Memberships in Scientific and Professional Societies	7.02***
8	Average Judged Quality of Societies in Which Membership is Current	**
9	Overall Occupational Satisfaction	9.51***
10	Self-Reported Number of Contributions Made to Medicine	1.45
11	Average Judged Quality of Self-Reported Contributions Made to Medicine	8.45***
12	Self-Reported Number of Non-Medical Contributions to Society	0.43
13	Total Number of Papers Presented at Scientific and Professional Meetings During Career	3.17***
14	Total Number of Publications	1.40
15	Level of Participation in Medical Research	1.90
16	Number of Scientific and Professional Journals Reviewed Regularly	2.25
17	Number of Subscriptions to Scientific and Professional Journals	3.35***
18	Number of Articles in Scientific and Professional Journals Read in Detail Each Month	0.87
19	Average Number of National and Regional Society Meetings Attended Annually	0.28
20	Average Number of State, County, and City Society Meetings Attended Annually	0.67
21	Total Number of Offices Held in Scientific and Professional Societies During Career	0.57
22	Number of Postgraduate Courses Taken During Career	6.91***
23	Number of Refresher Courses Taken During Career	2.55
24	Number of Scientific and Professional Society Courses Taken During Career	0.93
25	Physician's Evaluation of Usefulness of Drug Detail Men	7.73***
26	Extent of Physician's Experimental Use of Drugs Provided by Drug Detail Men	4.42***
27	Number of Techniques Other Than Journals, Meetings, and Drug Detail Men Used in Keeping Abreast	5.88***
28	Percentage of Patients on Which Consultations are Requested	**
29	Average Number of Patients Referred to Colleagues Per Month	1.36
30	Average Number of Patients Referred to Physician Per Month	1.12
31	Number of Patients Scheduled Per Hour	8.73***
32	Proportion of Working Time Spent with Patients	11.57***
33	Proportion of Patients Requiring Excessive Time to Explain Diagnosis	3.03***
34	Proportion of Patients Requiring Laboratory Work	1.75
35	Proportion of Patients Requiring Laboratory Work Outside Physician's Office Building	5.45***
36	Laboratory Facilities Within Physician's Office Building or Not	2.25
37	Proportion of Office Patients Treated Without Charge	1.60
38	Proportion of Office Patients Treated at a Reduced Rate	2.33
39	Average Number of Hours Per Week Spent in Treating Charity Patients Outside Office	8.42***
40	Self-Estimated Average Socioeconomic Level of Patients	8.76***
41	Degree to Which Physician Adheres to Patient Appointment Schedule	7.83***
42	Average Number of House Calls Made Per Week	7.07***
43	Average Number of Emergency Office or Hospital Calls Made Per Week	3.47***
44	Degree to Which Physician Considers Psychological Factors in Diagnosis	3.83***
45	Average Number of Hours Per Week Devoted to Medical Practice	9.73***
46	Average Number of Hospitalized Patients	6.78***
47	Number of Hospitals in Which Physician Works	2.93***
48	Average Judged Quality of Hospitals in Which Physician Works	**
49	Number of Hospitals in Which Physician Maintains Courtesy Privileges	2.30
50	Average Judged Quality of Hospitals in Which Physician Maintains Courtesy Privileges	**
51	Number of Formal Responsibilities Physician Has in Hospitals	12.85***
52	Self-Estimated Value of Office Equipment	0.37
53	Number of Nurses on Physician's Ancillary Staff	6.98***
54	Number of Clerical, Administrative, and Janitorial Workers on Physician's Ancillary Staff	0.55
55	Extent to Which Physician Limits Size of Practice	5.81***
56	Self-Reported Satisfaction with Size of Practice	8.29***
57	Amount of Malpractice Insurance Carried	5.89***
58	Average Number of Speeches on Medical Topics to Laymen Groups Per Year	0.69
59	Average Number of Speeches on Non-Medical Topics to Laymen Groups Per Year	3.06***
60	Average Amount of Vacation Taken Annually	4.46***
61	Extent to Which Physician Plans and Maintains Leisure Time Activities	6.55***
62	Number of Current Memberships in Social and Avocational Organizations	0.72
63	Number of Offices Held in Social and Avocational Organizations	1.31
64	Number of Current Memberships in Civic and Political Organizations	1.11
65	Number of Offices Held in Civic and Political Organizations	**
66	Number of Church Activities in Which Physician Engages	0.04
67	Characteristics Physician Considers Important for Success in Medicine: Number of "Common" Responses	5.00***
68	Characteristics Physician Considers Important for Success in Medicine: Number of "Uncommon" Responses	5.22***
69	Characteristics Physician Considers Important for Success in Medicine: "Commonness" of Responses Elicited	7.86***
70	Self-Rating of Success in Medicine	**
71	Interviewer Rating of Condition of Physician's Office	**
72	Interviewer Rating of Likeability	**
73	Interviewer Rating of Physician's Involvement in This Project	**
74	Age at Which Received M.D.	12.06***
75	Years of Experience Since Receiving M.D.	3.35***
76	Individual Practice Rather Than Group, Clinic or Hospital Practice	6.13***
77	General Practice with Specialty Rather Than General Practice Without Specialty	**
78	Undergraduate Grade Point Average	2.06
79	Grade Point Average for First Two Years of Medical School	9.89***
80	Grade Point Average for Last Two Years of Medical School	10.11***

*Entries represent absolute differences between groups without regard to direction of differences.
**Criterion measures on which data for one of the groups is missing.
***$p < .01$

different populations or to cause one to look for a general factor which could account for much of these differences. In the present case, as with the Specialist study of Chapter VII, it appears that most of these differences could be accounted for by a general professional seniority factor. It is pointed out in Chapter VII that because the non-Utah subsample was drawn from alumni of the College of Medicine of the University of Utah which has only been awarding the M.D. degree since 1944, this group would be considerably younger and less experienced than the Utah subsample which was drawn from practicing Utah physicians, many of whom received their M.D. degree prior to 1944 and from medical colleges throughout the country. Thus, as a consequence of the greater professional experience of the Utah group one would expect this group to score higher on most of the criterion variables studied. To check this possibility, the variable measuring years of professional experience was "partialed out" of the other variables and the t-tests were run again. This served to reduce the number of significant mean differences from 41 to 7. An inspection of these 7 significant t-values indicates the following: (1) the non-Utah group has received their internship and residency training in more hospitals than the Utah group, (2) the Utah group expressed a higher level of overall occupational satisfaction than the non-Utah group, (3) the Utah group tends to consider the drug detail men as a more valuable source of information than the non-Utah group, (4) the Utah group makes more house calls than the non-Utah group, (5) the average age at receiving the M.D. degree is lower for the Utah group, and (6) and (7) the Utah group tends to have a higher medical school GPA than the non-Utah group. These results of few unexplainable differences encouraged the authors to pool the data from these two groups and treat them henceforth as a single, composite group, recognizing though that the non-Utah group would tend to lower many of the criterion score distributions and means.

The next step in the development of the criterion measures for the validation study was that of intercorrelating, factoring, and rotating the resultant factors to a final solution (see Tables XI, XII, and XIII). As shown in Table XIII this resulted in 30 rotated factors, the same number as in the 1963 General Practitioner study. Unlike the present Specialist study, computed coefficients of congruency between the rotated factors of the 1963 General Practitioner study and the rotated factors of the present General Practitioner study were generally moderately high and by and large indicated that the factors were quite congruent. An examination of the results of this procedure, which are presented in Table XIV shows that nine of the factors were very congruent with nine of the 1963 factors and were given the same titles:

1963 Factor No.	Present Factor No.	Title
DD	J (reflected)	Achievement in Education
K	C	Hospital Staff Recognition
X	E (reflected)	Civic Participation
AA	L	Interviewer's Rating of Likeability
H	B	Group or Clinic Practice
W	Y	Off-the-Job Socialization
E	F (reflected)	Size of Medical Practice
R	M (reflected)	Keeping Abreast by Means of Journal Reading
M	N (reflected)	Self-Evaluated Contribution to Medicine

Table XI

Eigenvalues and Cumulative Proportion of Variance Accounted for: General Practitioner Sample

(N=242)

Factor	Eigenvalue	Cumulative Proportion of Variance
BB	4.74	.08
H	3.91	.15
K	3.65	.21
O	2.95	.26
X	2.68	.31
E	2.50	.35
U	2.39	.39
V	2.21	.43
C	2.19	.46
DD	2.08	.50
A	2.04	.54
AA	1.97	.57
R	1.89	.60
M	1.84	.63
F	1.71	.66
T	1.69	.69
D	1.65	.72
J	1.53	.74
CC	1.46	.77
G	1.45	.79
L	1.44	.82
Q	1.36	.84
I	1.33	.86
N	1.24	.89
W	1.21	.91
S	1.18	.93
Y	1.13	.95
P	1.10	.96
Z	1.07	.98
B	1.01	1.00

Table XII

Unrotated Factor Matrix and Communalities: General Practitioner Sample

(N=242)

Variables	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	h^2
1	-05	09	-04	09	-11	-01	53	12	-03	-14	24	-04	09	10	-08	-01	08	23	-06	08	-19	-28	01	-13	-27	-12	-15	-07	16	-02	77
2	11	-17	-04	-35	-21	32	-01	13	-05	01	19	14	03	-11	-11	-06	-16	-12	-20	-09	07	14	-25	-13	-08	08	20	07	05	-11	68
3	-00	-00	-09	-25	-29	16	-02	11	-05	03	38	14	-00	12	-29	02	-14	-09	-10	05	09	07	07	-19	-18	-02	32	18	09	-16	75
4	00	-24	-13	-28	-12	02	03	10	-04	-10	15	11	-07	13	-33	15	37	01	07	-00	-23	08	07	-21	-05	-13	-13	-03	-05	-14	68
5	09	04	-16	-23	-00	01	-02	-10	27	26	04	07	18	12	25	-02	-19	02	24	20	-10	-15	07	08	-30	20	-25	-20	-17	-09	80
6	-13	-09	08	03	-27	-01	10	22	-26	01	-12	12	09	-14	48	12	-04	03	-06	-03	01	-21	-03	-01	-06	-07	08	-28	02	-08	69
7	-30	15	-23	04	19	05	-17	25	-07	-07	26	02	-01	-09	-04	-04	07	13	06	02	25	-23	12	08	03	04	09	-37	-14	02	71
8	-36	17	-23	-01	01	-02	03	16	01	16	52	-02	-08	-08	04	-00	08	-11	-10	-07	32	04	-01	-04	-03	-01	17	01	-05	09	73
9	07	07	18	-00	-13	-02	12	02	20	-27	07	00	17	06	33	02	17	-25	-05	29	-05	-13	00	-05	-05	-06	14	10	06	30	66
10	15	-07	-01	15	-09	-14	05	29	-23	09	24	-17	30	19	-08	-09	-04	-30	09	-09	22	09	10	04	09	-27	11	08	-10	-00	73
11	-21	09	02	06	-10	-05	-14	36	-15	23	25	08	24	-01	-13	04	-12	-39	06	06	19	10	04	16	03	01	-10	01	16	-17	75
12	23	-01	11	-14	07	03	06	-04	-16	-14	-30	08	01	-11	-15	-24	-04	-12	-06	-06	31	-26	14	-17	09	-08	-14	-25	17	12	70
13	25	-04	-11	11	07	-17	18	27	-11	-07	30	01	17	-21	-35	04	02	32	-06	14	00	-12	-02	22	07	-07	-13	-17	04	-10	78
14	10	-10	-21	00	09	-10	-07	24	-07	07	16	-01	04	-12	-49	-05	-04	30	03	08	04	05	-18	31	15	03	-03	-28	-05	-24	84
15	-12	-02	26	-12	-16	-05	-12	18	19	05	22	13	-22	-00	-17	-07	02	-04	11	-01	-09	21	14	08	08	-08	10	-46	-10	-05	70
16	04	-09	-01	-01	08	-17	01	26	19	-12	-00	03	-01	-05	-57	00	02	06	06	11	03	-02	-09	37	-05	01	18	-29	-04	09	79
17	-16	04	07	-24	07	06	-17	04	10	-20	-17	05	-16	-03	-27	02	13	-24	-03	-03	-05	-07	-05	08	-25	-22	16	-28	-05	12	63
18	-05	-18	04	32	-05	08	11	08	33	03	-19	20	-04	04	-12	-03	01	-19	16	05	-18	05	05	23	04	06	28	-25	17	09	71
19	00	28	19	18	16	08	06	22	-04	-05	20	14	01	-06	10	00	25	-00	-10	06	02	-09	-17	11	-09	19	16	-28	10	-05	60
20	-11	02	-08	-08	09	26	-29	-01	21	09	02	-19	23	-28	07	10	37	10	-11	-09	06	-03	15	15	-01	01	22	-16	01	10	72
21	-02	-03	-23	-11	26	21	-04	09	09	04	-07	02	20	02	29	-02	-08	01	29	-01	08	-36	09	10	-07	-12	-18	-25	-25	-15	76
22	21	-06	07	09	-04	38	-05	-05	-29	-10	16	02	05	19	12	05	21	-03	31	13	14	16	05	29	06	06	-01	-02	00	20	72
23	33	01	-05	-04	-04	19	-04	-09	-15	-05	17	09	14	-06	13	-10	01	06	-01	00	15	15	-23	19	-25	07	-07	-41	05	-03	65
24	04	04	13	21	00	17	08	-18	-01	-03	09	17	10	12	17	16	14	-01	-14	-09	12	26	-06	12	-15	12	-03	-54	-09	-00	74
25	01	-15	-08	-13	-18	-02	03	-05	19	-14	-20	-06	33	-22	19	-14	04	-19	-14	27	02	18	-03	12	22	08	17	03	-28	-09	74
26	-02	-16	16	13	-11	-11	25	33	-03	-19	05	-09	-09	-12	20	10	-18	-01	21	-03	03	-07	-12	-04	01	-08	27	-00	-29	05	66
27	19	-06	02	-07	02	-18	-04	-12	-01	05	-09	08	03	-05	05	08	10	-19	04	-02	-14	10	-22	-13	18	-04	-13	-60	13	-04	70
28	12	-38	-13	32	35	-05	-07	08	13	-13	11	-13	-08	-12	-00	-22	01	-21	04	03	-07	-04	03	-15	-32	07	-10	10	28	-18	85
29	30	15	-10	05	01	-15	01	42	03	17	26	-20	10	-21	20	-06	16	-14	-15	-23	-03	06	-03	-03	02	-10	-10	-01	07	10	72
30	-24	-12	06	13	05	05	22	34	17	11	32	11	-16	09	13	-04	03	-13	-07	-18	02	12	-01	-22	08	06	-16	-22	-16	01	70
31	-10	-11	-09	-13	-25	-25	18	24	-06	13	-21	-12	17	03	17	-03	16	03	21	-19	02	32	08	05	-12	-05	24	-16	12	-03	74
32	-12	10	15	-26	-33	16	12	13	02	02	-06	-14	13	-01	15	-34	01	39	-06	-07	-19	-09	-03	-14	21	-01	-01	-14	11	07	77
33	-06	09	32	07	-12	-06	-24	02	-04	04	01	-06	27	17	-15	13	21	-08	-02	08	05	09	15	00	-11	03	-31	21	03	-34	70
34	09	12	12	07	-24	01	-19	14	07	-31	17	24	01	12	-02	01	16	01	05	-01	06	-40	-01	04	15	02	-15	21	05	-18	68
35	17	12	23	-31	-03	00	23	30	14	00	11	-11	07	03	-10	06	15	-06	10	-22	-03	-14	-11	-02	-07	00	-09	17	-37	-14	72
36	15	18	-19	16	28	03	13	-09	-12	06	-01	17	-17	-07	-07	12	-10	-22	-04	25	-11	04	16	01	-04	-32	-03	08	-22	06	65
37	19	19	35	09	00	-05	-02	30	25	-08	-04	07	10	-26	-14	01	-18	-14	01	-05	20	-08	-01	-12	-19	-05	03	-06	14	-15	67
38	05	01	30	-14	15	31	19	09	24	07	-03	-20	07	07	-14	02	-14	-03	-13	-27	12	-01	09	24	01	-07	-07	10	19	-12	66
39	-26	-16	30	-03	03	16	05	07	-24	28	-05	-05	-02	-32	03	39	-08	-02	-02	10	-07	-09	-04	11	-03	-05	-06	03	-02	-17	70
40	08	-11	34	-17	49	02	-16	03	-11	07	20	23	22	06	12	-15	09	17	06	14	00	-10	-13	-21	-03	-09	13	05	-05	04	79
41	12	10	-06	-04	-21	04	-12	-01	12	-18	19	-12	01	-00	-11	37	-25	-00	17	-22	-06	-01	-23	-15	03	12	-12	-16	-03	30	71
42	11	-17	-04	10	04	16	10	19	14	12	-18	02	13	38	-06	10	11	02	-11	11	24	-19	-17	06	07	-03	26	24	-06	12	68
43	24	07	-04	21	-06	05	-11	40	04	30	-38	-14	03	16	01	09	-07	04	-16	10	05	08	-07	-08	-12	16	18	21	09	-00	77
44	-14	-11	39	18	-11	02	-15	-17	13	01	05	-16	05	-09	-23	18	08	11	11	-04	-07	-12	-03	-22	-03	-20	-12	-05	08	-10	59
45	09	15	-26	14	-20	06	-11	37	06	-11	-32	-25	-15	18	07	10	01	16	-03	06	-02	-12	05	14	-05	-06	17	-23	-02	-08	72
46	14	-04	12	-25	14	00	-01	16	09	18	-02	08	-44	19	23	21	-00	22	-12	06	13	02	08	05	16	-17	05	04	20	-26	78
47	-04	-05	36	-08	54	-18	00	14	-04	10	04	-01	10	12	09	-03	12	16	07	09	-09	-04	-19	-08	03	01	34	-00	11	00	76
48	02	-22	-08	12	-28	01	-13	-05	-02	-13	61	-22	14	12	06	05	05	-01	-13	-12	-10	-16	03	04	07	-04	-09	05	12	09	75
49	17	02	-09	-01	-21	-09	04	-36	06	38	35	-02	-02	00	-00	-00	02	03	02	14	-20	-23	09	-06	-13	-06	18	-38	-02	09	83
50	38	-05	-08	06	-26	05	-01	-31	-02	24	40	07	-06	-09	-16	00	08	-01	-08	07	-21	-26	19	-11	-00	-05	32	-02	-02	17	90
51	-15	22	09	-14	-03	-03	00	-07	-08	-21	10	-25	-05	09	00	-05	-12	-22	24	20	-20	11	06	12	06	-13	22	-33	30	-02	74
52	17	-03	01	00	-05	-00	11	25	24	01	-01	22	09	-06	14	00	11	-18	-15	10	-04	12	25	-06	23	-04	-25	-29	-16	-09	64
53	09	-01	09	01	02	-07	-08	44	04	04	09	-09	-38	-14	15	06	03	-00	-08	32	08	21	-05	-27	-04	-02	-14	-02	-01	17	72
54	30	-04	15	-01	-08	22	-04	15	-17	-18	11	-11	-22	-04	23	02	12	-04	09	18	02	37	02	-12	01	05	-12	-22	-06	-06	66
55	01	-10	06	17	-12	-24	-30	-05	12	02	21	16	09	19	29	-08	-24	10	-04	-29	03	05	-21	02	-10	-22	-14	-23	-09	04	77
56	13	-09	05	-14	-19	-12	-27	27	-05	-04	-10	-00	-10	-00	38	-08	-04	17	-03	-02	05	-06	24	21	-16	-09	20	-15	-01	-17	68
57	-32	-05	-19	09	00	02	15	31	-12	-02	-18	21	00	02	13	-02	07	06	-08	04	-28	-09	08	-17	-09	10	-04	-09	08	-26	62
58	14	01	07	15	04	13	06	24	-01	09	-17	-11	-01	08	-43	-04	-05	23	03	-11	04	14	16	01	08	12	-05	-34	-14	06	65
59	-05	02	28	09	-12	14	05	13	-07	01	-11	18	03	10	-19	-08	-19	23	-09	-01	04	16	19	05	-14	-12	-06	-32	-09	31	65
60	-18	-09	09	07	07	-04	08	-15	13	14	21	-11	04	-13	18	04	14	33	20	-06	27	23	18	-12	-06	01	-08	-02	14	34	73
61	11	05	19	-03	03	-10	03	-23	08	03	31	22	18	-08	-05	07	-15	11	05	09	16	10	18	-26	11	15	10	29	02	24	68
62	06	-08	10	-09	11	-34	03	02	-10	-06	08	-09	-16	16	01	09	06	-13	-06	-06	47	-30	20	-01	06	30	06	-22	-08	-00	77
63	14	-13	13	-26	-00	-16	04	-04	-14	08	-23	-21	-12	-02	-13	04	-04	-25	01	-03	20	-34	11	-07	-14	22	-06	-25	-04	18	71
64	-23	-06	-24	-11	00	-01	C1	38	-01	-03	-25	06	11	-01	-07	03	06	-09	05	05	35	-11	-11	-25	-02	-07	-13	-17	10	35	76
65	-06	-03	-22	-03	-17	18	-03	10	01	03	-39	12	29	00	-22	15	-04	08	07	22	27	09	-04	-40	01	-10	-05	-19	16	20	87
66	-06	-10	17	17	17	42	-06	05	-06	01	-09	-16	22	-04	00	-05	-21	-18	-07	-05	-20	-20	20	-07	14	-02	07	-27	-03	-10	69
67	-05	-05	00	-15	21	00	20	-08	-00	01	18	-16	07	22	04	11	-08	-13	-19	14	-09	-03	-02	08	04	08	-19	-59	17	06	76
68	21	06	01	04	03	-02	-03	-11	-10	13	-34	19	-16	01	-05	-09	14	-06	06	-44	-01	01	05	-11	-01	-06	-02	-37	15	13	69
69	-11	05	-02	-13	07	-14	00	-24	04	03	14	-15	07	09	04	03	-15	-04	-13	21	-16	16	-06	14	06	05	-05	-66	11	-04	79
70	-09	-07	26	13	-56	-15	-07	18	-02	04	-11	18	-12	-09	08	-04	-08	09	01	21	06	-28	01	13	07	21	-07	-11	10	02	78
71	11	00	-08	08	18	28	-18	44	-00	-01	21	-16	-20	02	17	-02	-13	04	05	01	-24	-20	-08	-44	12	02	04	-23	-05	12	91
72	10	-04	-35	-09	20	-09	-08	08	12	-31	00	14	16	-01	11	26	-04	10	-09	-20	-05	12	24	-31	04	09	13	-14	19	-18	78
73	14	13	07	04	18	-26	03	06	-11	-10	-11	05	35	04	07	17	-16	11	04	-11	-18	13	10	-34	07	02	35	-17	-08	-18	76
74	-16	-09	19	00	08	-18	-18	-03	-09	-25	-06	-16	10	08	-11	-05	-07	16	-42	14	-05	18	12	-05	-23	-05	-08	-06	-31	27	76
75	01	-08	-09	-08	14	00	03	-02	12	-09	26	09	-04	02	28	08	-20	11	-07	09	42	-09	01	37	11	-25	-08	10	22	12	77
76	-10	-06	00	08	03	03	05	-39	-10	-07	-10	13	-05	-04	06	16	05	-10	-18	-36	-06	-18	-08	31	04	-01	18	-23	-09	10	67
77	-23	-02	02	05	07	14	05	02	-02	-16	48	04	-14	09	-11	-13	-13	-03	08	-10	12	09	11	-18	-02	18	17	-03	-03	-15	59
78	-15	-02	01	-09	11	-11	-24	40	-10	15	05	14	13	09	-18	02	02	-15	-03	-01	-48	-22	01	-02	10	07	-10	10	03	38	87
79	01	03	-05	-11	08	-03	-03	57	-04	04	-00	11	-00	05	11	-03	-03	-10	-03	-14	-35	19	04	41	-03	06	-15	34	08	33	99
80	16	-07	04	-18	13	05	08	28	-06	-18	11	10	05	-16	08	17	-12	10	08	-09	-29	05	21	41	-10	14	-01	38	12	27	89

Note: Decimals have been omitted

Note: Factor sequence has been arranged to correspond to Phase I factor analysis

Table XIII

Rotated Factor Matrix and Communalities: General Practitioner Sample

(N=242)

Variables	Factors																														h^2
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	
1	-06	-05	-02	02	-03	01	83	00	05	-06	12	02	-01	-01	-08	00	-12	05	08	-09	-06	-03	-06	-04	-00	01	-00	-07	-03	00	77
2	-03	-00	01	-79	-00	-08	-06	03	09	06	03	06	-01	01	-03	03	00	05	02	08	06	06	-04	-05	03	00	-02	04	07	03	68
3	-24	05	-06	-68	09	06	08	09	00	-11	22	-18	18	07	01	01	-06	-08	15	-04	-06	03	-05	00	-06	-02	12	10	-03	-02	75
4	04	-01	-02	-19	05	00	15	09	-03	-12	05	10	01	-10	-13	02	05	-06	70	-08	00	03	-02	-07	-11	16	08	00	01	02	68
5	05	-01	-03	00	-00	-00	01	04	03	01	13	04	-08	00	04	-01	-04	01	-05	04	01	-85	02	03	-07	01	-00	-19	03	04	80
6	-04	09	03	01	-62	00	14	-07	14	00	04	16	03	-07	16	31	-08	05	-15	08	09	-02	04	-17	05	-02	09	-05	04	-00	69
7	-64	05	07	12	-20	00	-01	-02	-05	-08	-02	-03	-02	-10	-30	-05	20	-02	-03	-04	04	-13	10	-17	13	-05	03	-05	-03	-03	71
8	-73	03	-02	-14	05	-02	03	04	-03	09	08	08	20	-02	03	01	17	08	-05	-00	-08	07	-03	-03	-18	-11	-09	-01	07	-00	73
9	06	-00	14	07	-02	-09	27	10	-05	-19	13	00	04	07	45	-12	09	-14	-09	42	10	06	04	-07	-07	-10	-04	-06	-03	12	66
10	-09	-01	03	-04	-03	-03	02	01	-06	03	05	04	79	10	-08	-08	-08	03	03	08	09	09	06	-00	08	-03	00	10	-01	03	73
11	-27	-04	-09	-18	05	12	-13	04	-01	-24	-12	02	57	-02	-10	26	-04	-07	-15	-03	-01	-05	-04	-13	-04	02	-06	-15	11	18	75
12	25	02	03	-05	-01	14	03	-04	-04	-05	-04	06	-01	-22	-05	-20	-01	01	-14	-12	03	11	49	-38	25	-08	-03	01	00	-14	70
13	01	-05	04	05	01	-01	33	05	-04	-11	13	07	10	-07	-76	04	00	07	-03	04	04	05	00	-02	-03	-12	08	-03	-01	09	78
14	-08	-00	01	-07	-03	01	-08	00	03	-00	-02	-02	04	01	-89	01	-01	-04	06	-02	00	-03	-06	01	-03	01	-03	-11	05	-02	84
15	-17	21	02	-09	-10	-03	-14	20	10	-03	08	19	06	-25	-16	01	03	-55	14	-09	-00	-01	-00	12	01	04	-04	-19	-11	-05	70
16	-03	-02	05	-03	01	-10	04	-07	-08	-01	-05	-09	00	09	-62	-08	10	-50	02	07	-06	05	15	-06	-11	01	-09	-09	-11	10	79
17	-01	02	08	-18	-18	-09	-02	-10	-26	-03	-14	-12	-10	-12	03	-07	30	-39	16	-07	-10	05	17	-14	-00	11	-16	-13	-16	-00	63
18	04	-16	-08	10	-03	06	-03	-16	02	07	08	09	-06	18	-03	-02	-04	-70	-08	06	06	06	-11	-07	11	06	-01	-09	14	08	71
19	-27	00	27	-00	-14	05	22	02	-04	-19	-02	13	-10	06	-10	03	18	-12	-31	-05	25	11	01	08	-05	15	00	-19	11	03	60
20	-14	01	03	06	-05	04	-12	-09	14	05	10	-01	-07	04	-03	08	76	-03	-00	11	08	-03	-05	-06	10	-02	05	00	-02	01	72
21	-09	-02	10	17	-25	-03	03	-13	-13	00	-13	08	00	-06	-05	-02	12	09	06	03	06	-65	05	-11	29	-13	00	02	15	-05	76
22	-02	06	02	08	06	00	-07	00	-00	-06	05	-14	11	05	03	-02	01	-03	11	02	77	-00	-03	-00	07	-10	-13	04	06	11	72
23	08	-08	04	-25	-15	-07	03	-06	03	05	05	07	-01	-13	-20	-11	10	10	-21	-05	53	-18	-02	-02	-10	-03	-04	-24	-03	-10	65
24	-08	05	-02	01	-06	-05	03	-20	-02	04	-01	34	-06	03	03	06	10	-14	-14	-10	52	-04	-03	05	-08	06	10	-34	-18	-23	74
25	15	07	-08	-08	-06	12	-18	-05	04	08	-07	11	04	01	03	-05	10	-03	-04	77	00	-04	-05	-02	01	06	03	-02	-02	-08	74
26	-14	04	12	05	-31	-35	17	11	-01	19	-07	05	12	01	01	14	-25	-20	-05	27	02	08	09	10	05	-02	04	27	02	-01	66
27	26	-01	11	07	-12	-15	-14	01	-01	03	07	27	-00	-20	-07	-03	00	-09	04	-05	08	04	09	-17	-04	15	09	-53	19	-16	70
28	00	-88	06	00	05	08	07	14	-05	02	-04	00	02	-03	-01	-08	-00	-03	-01	-04	-05	-02	02	07	10	01	04	04	06	-01	85
29	-02	-09	00	01	-13	-13	13	27	02	07	08	34	37	-03	-07	-14	31	22	-19	-04	-05	10	-00	07	-05	02	01	-02	16	25	72
30	-43	-05	03	-03	01	-10	10	17	09	09	-10	59	08	-01	07	03	-13	-12	09	-09	-03	-00	-03	04	09	03	-05	-09	00	02	70
31	06	09	-06	03	-32	12	06	-01	33	40	-10	-01	35	01	05	01	07	-20	10	03	04	-01	-00	-10	-27	13	20	-01	09	05	74
32	09	38	05	-06	-17	06	24	11	56	05	04	02	-12	-13	03	-14	04	08	-02	04	-11	02	-14	-10	25	05	-10	-05	-01	02	77
33	15	-02	-04	04	19	18	-02	07	10	-50	-18	-03	31	04	05	25	11	07	09	-08	03	-08	-05	12	-11	17	02	01	-18	-09	70
34	-03	03	-00	-01	-08	-08	11	-03	08	-73	-00	03	-01	-02	-02	-11	-06	01	05	02	02	03	02	05	01	-09	-03	23	14	03	68
35	07	25	14	-17	06	-23	29	09	00	-07	-21	21	18	03	-06	00	13	02	15	06	-09	-19	21	28	-04	16	-10	26	10	07	72
36	02	02	-04	10	08	11	02	07	-75	10	12	03	02	-03	01	01	-09	02	-00	-02	-01	-02	-09	00	06	-04	-00	03	-02	04	65
37	13	-09	09	-21	01	-11	14	20	-05	-22	-14	09	16	-07	-07	08	12	-29	-45	-07	-14	-02	14	-05	03	01	12	14	01	-10	67
38	17	06	-04	-19	24	04	16	-08	12	04	-30	05	11	13	-02	09	23	-13	-11	-17	-07	-01	09	23	28	-29	-09	01	03	04	66
39	02	06	06	-03	-08	03	-00	00	-05	05	-06	-01	-02	-03	-02	80	04	04	-00	-01	-03	02	00	04	11	-01	-12	-00	03	03	70
40	-01	-03	84	-07	09	07	-04	05	-02	-07	05	03	-01	-06	02	01	01	10	01	-02	08	-11	-02	-03	08	-07	03	06	-10	02	79
41	-02	09	-19	-07	13	-75	-01	04	08	-05	07	-04	-05	-04	-02	-02	-01	00	-01	-09	06	-03	03	-11	00	04	11	-10	00	07	71
42	03	04	17	-04	02	01	04	-13	-03	-04	-02	02	06	70	01	-06	-00	-05	07	11	02	03	05	-15	03	-16	-11	19	04	-01	68
43	18	-05	-06	-06	-12	08	-09	28	03	06	-05	-04	09	66	-00	03	02	02	-25	-08	-07	03	-03	-09	-01	17	08	16	00	11	77
44	15	-09	08	13	14	-22	08	03	16	-22	09	-06	04	-12	02	32	12	-15	12	-16	-14	10	-09	-01	10	06	-07	04	-12	-33	59
45	00	10	-28	13	-53	-06	07	17	-02	-03	-09	-16	-05	38	-16	-16	13	-12	-00	-04	-00	-03	-00	-04	12	04	09	-03	00	-03	72
46	08	17	14	-07	-20	19	-11	32	-02	-02	-08	10	-16	20	02	11	-02	-01	14	-27	-08	04	06	22	-07	-48	10	-05	18	-06	78
47	-04	-03	78	11	01	07	03	06	07	11	-08	-10	-01	15	-02	06	03	-08	-05	-02	-07	09	04	12	-00	01	10	-10	04	07	76
48	-18	-22	-14	-04	01	-27	14	-08	28	-25	36	02	24	-04	01	-04	05	21	20	06	08	12	-10	17	09	-19	-05	-11	-08	10	75
49	-04	05	01	00	-04	-04	10	-05	-02	10	77	-00	00	-05	-02	-00	06	-07	01	-07	-02	-22	03	09	-05	06	-07	-29	04	-18	83
50	02	02	-02	-15	09	-04	06	-05	-10	-03	89	-02	-01	-00	-02	-07	07	-02	05	-02	03	07	05	13	06	03	-01	07	06	-03	90
51	-06	10	00	03	-09	-01	07	12	-02	02	-02	-45	15	-25	10	-07	-01	-32	01	06	06	09	-02	07	13	-00	03	-49	11	-00	74
52	09	09	-11	06	-04	14	00	21	-10	-13	-00	60	08	-07	-04	-05	04	-14	04	19	04	-12	02	-07	11	-03	16	-13	01	03	64
53	-11	-08	05	00	-10	-09	-03	74	-09	05	-02	18	-07	04	02	07	-03	01	-03	00	01	12	05	-11	-11	-04	-09	-01	-09	09	72
54	06	-01	-03	-08	-13	-35	-04	51	-02	03	-07	13	-00	-13	04	-00	-03	01	08	05	52	08	02	10	06	05	04	-10	-01	-09	66
55	-02	-10	11	04	-27	-15	-19	-16	15	-08	08	26	19	-11	06	-15	-15	03	-14	-19	-03	-17	-24	06	-13	-17	-01	-13	-26	-10	77
56	06	04	00	-04	-65	14	-14	15	16	-05	04	-05	06	-02	-00	-03	10	-09	-05	-00	05	-15	10	15	-04	-18	14	10	-12	06	68
57	-16	-11	-03	02	-32	29	22	-01	04	-05	-15	14	-16	04	03	14	-15	-00	12	-03	-14	-05	-15	-16	09	25	20	-04	07	13	62
58	04	17	-12	08	10	-00	00	11	08	15	-08	12	02	15	-45	-07	01	-22	-01	-24	12	01	13	-07	27	20	07	03	-19	-05	65
59	04	26	-03	-02	-03	04	09	01	05	10	03	12	-00	-04	-12	02	-09	-30	-13	-24	17	00	-02	-21	14	-02	-05	00	-51	04	65
60	-19	-03	07	30	27	-03	06	13	34	30	11	04	00	-15	13	09	17	-01	-03	-13	17	-03	-06	-13	-19	-25	05	10	-12	-08	73
61	-07	11	18	-05	52	-04	-05	06	07	-05	30	-01	01	-11	13	02	-13	04	-16	08	03	03	01	-03	-12	-17	25	22	-10	02	68
62	-27	-01	05	12	-05	01	-07	-03	06	-11	01	07	06	09	-04	-04	-07	02	-01	-01	02	02	75	08	-09	-12	11	-08	-01	-14	77
63	12	-02	-04	-01	-04	-07	-03	-00	01	09	07	-06	-01	-00	03	07	01	-01	-01	-05	-06	-09	77	-13	04	11	-12	-10	-04	-01	71
64	-17	-01	01	01	-09	-09	05	09	03	06	-22	08	06	09	00	-06	06	-01	05	-00	-09	-01	20	-75	-04	-02	-06	01	-00	07	76
65	13	11	-11	-08	08	-02	00	10	03	05	-04	-05	-01	16	-03	04	03	-05	03	-01	03	-04	-05	-83	03	07	16	-00	-06	-20	87
66	02	-07	04	-01	-05	03	-01	-11	-02	-00	01	04	06	01	04	17	09	-09	-09	02	04	-05	02	-00	76	10	07	-13	-05	-03	69
67	-07	-02	04	03	07	-03	18	-03	01	08	01	12	-03	-00	-07	03	-01	-00	05	-03	09	-11	20	-02	16	-11	01	-76	-06	01	76
68	24	05	-02	07	-15	02	-13	-17	-03	16	05	21	-06	-13	05	-21	08	-13	-05	-49	08	11	20	-18	03	17	06	-04	12	-06	69
69	-04	06	-01	06	-02	-02	-04	-03	05	12	09	-02	-04	-14	-13	01	01	-09	-04	06	02	-12	-01	05	01	-02	05	-80	-12	-13	79
70	03	12	-18	07	-31	05	-02	09	35	-36	18	05	-10	00	-04	23	-27	-21	-23	10	-02	02	14	-13	-09	01	-20	08	-02	05	78
71	-25	-10	21	-02	-22	-34	02	47	-01	02	13	12	-13	08	01	-11	-01	09	04	-13	-02	-03	-04	-08	51	12	06	-06	11	11	91
72	-06	-17	-03	-08	-06	-05	-02	-00	-00	-01	-06	09	-12	-04	-01	-15	12	07	13	-02	-06	-00	-02	-11	02	-08	79	-08	06	02	78
73	10	13	30	04	-09	-08	02	-03	-04	10	01	-02	15	01	-01	-01	-09	-00	-11	04	-08	02	-03	03	09	25	69	-05	-05	-10	76
74	01	-01	06	07	00	-02	-01	05	-04	04	-08	-03	-05	-02	-01	-03	04	09	05	12	-06	11	06	01	-02	08	00	-08	-83	03	76
75	-13	-03	02	03	-02	-01	-00	-06	-04	-04	-04	-02	04	-00	-03	-03	00	08	-13	05	08	-05	-02	-03	-09	-82	-08	-05	04	07	77
76	-00	07	-06	07	-17	-12	-09	-64	-11	10	08	08	-19	-05	08	06	10	-06	-04	-05	09	17	12	13	03	-04	-05	-13	-00	-03	67
77	-55	-10	03	-24	18	-02	05	05	09	-02	-01	-04	02	-14	01	-06	-17	-11	06	-07	08	04	-01	19	14	-00	12	04	-03	-14	59
78	-06	01	21	07	02	-09	-07	01	-01	-19	13	04	07	06	-02	04	-02	-03	15	-08	-27	02	-02	-19	15	25	-09	-07	-07	70	87
79	04	01	-03	-00	-09	01	-02	10	-01	04	-22	10	14	08	-00	-05	01	-04	-01	-04	-00	01	-16	09	-07	-03	-11	09	-02	91	99
80	12	-03	00	-04	05	-05	13	-00	-01	04	-06	-13	-07	-08	-06	11	04	-04	-02	06	15	-02	-02	20	-02	-22	14	24	-02	78	89

Note: Decimals have been omitted

Note: Factor sequence has been arranged to correspond to Phase I factor analysis

Table XIV

Coefficients of Congruency Between Rotated Factor Matrices of 1963 General Practitioner Study and Present General Practitioner Study

	Present General Practitioner Study Factors																													
1963 General Practitioner Study Factors	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD
A	-04	13	09	-07	23	15	-08	13	00	-06	-63	07	-05	04	02	-16	-37	-09	10	13	07	-25	07	-26	-11	23	01	09	07	-07
B	05	12	06	08	12	04	-01	18	10	-01	-08	-09	16	01	-15	-12	10	-20	12	17	00	01	03	09	-07	01	-01	04	-07	-62
C	-03	-08	00	-16	00	-13	03	01	-22	04	-08	03	04	11	-05	-17	-10	-13	11	-22	01	10	-36	02	17	-02	-03	02	-13	-36
D	-13	02	28	05	-18	-20	16	02	-05	02	-11	11	17	03	-06	10	27	00	-12	-16	-06	-24	05	-10	-06	25	-15	-12	15	00
E	06	38	-20	05	09	-70	03	01	-06	01	09	07	06	-03	18	-03	10	03	16	-11	06	09	09	28	03	-14	-15	27	-15	17
F	13	-16	05	07	09	-17	03	-05	20	-06	-07	-02	08	08	-39	-07	18	02	-15	-09	16	-29	12	-10	-09	-23	-07	-16	-36	-05
G	05	-20	09	09	11	16	12	00	16	-01	11	-09	03	06	-14	23	-06	09	-01	-29	-19	04	00	15	18	-18	-10	-06	-31	09
H	01	76	-11	-01	-12	-06	-06	-06	08	-01	03	07	-10	02	-03	-09	03	12	-05	-10	24	-21	-08	-03	05	10	-08	-01	12	-01
I	-16	-10	01	05	01	16	10	00	00	-09	-08	-10	02	-02	-18	-22	-19	-19	-26	-24	-15	27	41	28	03	11	-02	11	02	-01
J	-24	-03	10	00	-25	-08	06	15	06	02	-20	13	-06	-18	25	-04	25	44	-03	-24	02	-03	07	15	-07	-22	04	-07	-06	-19
K	00	-08	86	06	21	20	06	04	-03	-10	-04	-08	10	-07	-12	05	-24	-01	06	04	-08	07	-04	-13	-03	06	-08	-21	01	-05
L	-27	17	-04	13	03	-02	-10	-02	01	-03	03	06	-03	-09	-24	-14	-07	13	16	18	-27	08	-01	-08	-02	10	13	-02	18	-02
M	01	-05	05	-05	00	03	-01	07	-01	-13	22	01	-08	-70	-18	-28	14	10	-08	09	-08	14	07	06	05	19	18	08	-02	12
N	00	-07	03	03	-24	14	18	-07	20	-14	18	-05	08	-17	20	-14	11	-21	-24	16	-00	-09	-19	-26	27	-08	18	-18	-14	00
O	11	04	-04	42	00	-13	12	09	15	08	-09	08	-01	01	01	16	32	-08	-10	24	-11	02	-03	07	06	-16	-01	18	-02	-01
P	06	-03	-12	21	-10	-11	04	21	-05	02	13	06	-11	02	09	04	-15	33	-08	-13	00	06	-02	14	07	-03	03	-24	13	02
Q	-04	16	-14	-01	06	10	19	14	-04	-07	00	14	15	12	-05	-10	03	27	-03	00	06	26	-23	04	01	05	09	-13	16	-01
R	-06	-14	-10	-34	-10	00	-09	13	01	03	04	-20	-70	-13	-06	-02	12	-03	-08	-03	-04	23	-27	12	08	-02	-07	04	16	07
S	09	00	-01	19	-06	13	-30	07	-23	01	05	04	-22	05	08	-01	11	-07	-03	-15	-01	-08	05	12	03	24	11	13	05	17
T	-18	-21	-06	-06	-03	-11	29	02	-16	-12	-12	00	-15	06	06	-23	15	24	-23	15	08	20	02	10	00	-13	-14	04	10	15
U	-18	10	02	-12	-17	-04	37	08	-14	-14	18	19	-09	-10	-11	08	07	03	18	-08	10	-19	00	-18	-01	-07	02	-05	15	05
V	00	-16	-15	-07	-15	-21	21	-37	04	-03	-45	-10	15	-08	17	06	18	03	14	-13	-04	31	-14	-11	04	06	16	-11	-37	-02
W	04	-13	-08	-05	-04	-12	-04	04	04	-12	-05	-03	11	-06	-02	-05	22	11	-03	-09	-08	-01	-05	02	72	-12	-08	05	00	03
X	08	06	-18	-01	-85	-03	-05	00	-17	-13	17	07	02	-12	00	04	-04	10	-08	-01	07	02	-02	18	15	-06	-02	-05	09	14
Y	05	-04	-07	-10	03	06	00	-06	17	-08	16	07	01	03	-08	-15	08	02	-12	-13	-21	09	00	16	01	-29	52	24	26	-06
Z	-10	-11	-15	-13	01	-42	-07	04	-14	11	15	-12	-12	-08	-19	-13	-18	-11	-07	-04	06	-15	-20	19	12	09	35	04	27	09
AA	-09	02	00	04	01	-06	-17	02	21	-07	08	81	07	01	-04	-06	-06	18	07	-18	02	-06	-05	-09	-08	12	21	-15	27	-04
BB	54	-01	-01	10	-10	-09	-04	16	-05	-04	21	01	-20	12	-07	-21	-04	-13	08	-19	02	11	00	-05	04	-01	-03	00	24	02
CC	00	02	-09	-09	00	11	-04	16	04	-10	12	-06	03	-04	-03	32	-04	01	-56	-16	-03	09	-06	-04	11	12	15	01	15	01
DD	-14	00	10	02	-10	03	06	-02	-15	-91	00	10	-03	-02	06	00	-09	-02	01	05	03	00	05	-02	19	-03	01	03	05	02

Note: Decimals have been omitted.

Also Table XIV shows that eight more of the factors were statistically congruent enough to eight of the 1963 study's factors to be classified as similar enough to be given the same titles:

1963 Factor No.	Present Factor No.	Title
A	K (reflected)	Level of Medical Specialization
B	DD (reflected)	Medical Consulting
CC	S (reflected)	Late Attainment of M.D. Degree
AA	A	Orthodox Success Image
Y	AA	Professional Stability
J	R	Diagnostic Thoroughness
O	D	Attainment in Publications
I	W	Emphasis on Medical Equipment

To this point, 17 of the 30 factors obtained in the present factor anlysis have been accounted for in terms of their congruency with corresponding factors of the 1963 study. Since they represent essentially the same factors as their companion 1963 factors, their descriptions and interpretations will not be given here. For the remaining 13 rotated factors (Factors G, H, I, O, P, Q, T, U, V, X, Z, BB, and CC) a description and analytical interpretation of each of them is given in the paragraphs that follow.

In the 1963 studies a series of "keeping abreast" factors appeared. By and large, the tendency seemed to be that for every different source of information studied and measured a different and corresponding factor emerged. For example, there were factors labeled Keeping Abreast by Means of Journal Reading, Keeping Abreast by Means of Refresher Courses, Keeping Abreast by Means of Professional Society Courses, etc. In the present General Practitioner study, however, three of these sources of information have collapsed into a single factor, Factor G. In Factor G the three highest loadings were on the variables measuring the number of postgraduate courses taken, the number of refresher courses taken, and the number of professional society courses taken. Note that these three sources of information involve keeping abreast by means of more or less formal instruction, rather than more informal sources such as discussions with associates, correspondence with peers, etc. However, to be consistent with the findings of the 1963 study it is felt best to label this factor Keeping Abreast by Means of Postgraduate, Refresher, and Professional Society Courses, thereby emphasizing that it seems to represent a synthesis of three of the 1963 factors.

Factor H is characterized by only two high variable loadings: the number of listings in honorary compendiums, such as Who's Who in American Medicine, and the number of offices held in scientific and professional societies. A similar, but not identical pattern was found in Factor P of the 1963 General Practitioner study: its highest loading variables were the number of listings in honorary compendiums and the number of papers read, rather than the number of offices held, in scientific and professional societies. Therefore, in view of these similarities (it is felt that the second variable loading on both of these factors generally represents professional society participation and involvement) that they should share the same title, namely, Professional Recognition for Achievements.

The highest loading variable of Factor I indicates that the doctor characterized by this factor treats patients of upper socioeconomic levels, thus the title Socioeconomic Level of Patients. Two other loadings show that the high scoring doctor on this factor sends his patients to an above average number of hospitals and that he did not impress the project interviewer as being very concerned about or involved with the present project. This pattern is fairly similar to Factor V, bearing the same title, of the Rural General Practitioner Sample.

Factor O of the present study has a coefficient of congruency of .39 (reflected) with Factor F of the 1963 General Practitioner study. In addition, both factors share major variable loadings on the variables measuring the extent to which the physician deliberately attempts to limit and control the size of his practice and the degree to which the physician rigidly adheres to his patient appointment schedule. In view of these similarities in factor patterns and the reasonably high coefficient of congruency, it is felt appropriate to give Factor O the same title as the 1963 Factor F, Established Medical Practice.

In the 1963 studies of urban and rural general practitioners, but not the combined study, a factor appeared in each (Factor B and Factor P, respectively) whose most salient feature was the extent to which the doctor relies on drug detail men as a source in keeping abreast of his medical practice. Also, both factors were characterized by only a few other minor or secondary variable loadings. Factor P of the present study has a very similar pattern and is given the same title, Keeping Abreast by Means of Drug Detail Men. Specifically, Factor P has a single high loading on the drug detail men variable and two other secondary loadings on the following measures: self-rated overall occupational satisfaction and the number of unusual or uncommon ideas about outstanding achievement in medicine.

Since Factor Q's only two high loadings (reflected) are on variables dealing with the length and variety of internship and residency experiences, it might be appropriately titled Prolonged Postgraduate Training. A very similar factor was obtained in the 1963 Specialist study but not in the General Practitioner study.

The only outstanding feature on Factor T was a loading on the variable dealing with the number of nominations a physician received from general practitioners as a preferred consultant, thus the title Number of Nominations as a Preferred Consultant. A secondary loading was obtained on the variable measuring the number of papers presented at scientific and professional meetings or societies. No even remotely similar factor was obtained in the 1963 General Practitioner study.

Two of the high variable loadings on Factor U suggest that it might best be labeled Medical Referring. Specifically, the physician characterized by this factor both refers an above average number of his patients to other physicians for consultation and advice and receives an above average number of referrals from other physicians. Other variable loadings show that the high-scoring doctor on this factor expends a great deal for up-to-date office equipment, has few responsibilities in the hospitals in which he works or maintains courtesy privileges, and tends to take a large number of the courses that are sponsored by scientific and professional societies.

The most salient feature of Factor V was a single high loading on the variable measuring the number of local (state, county, and city) scientific and professional societies a physician attends annually, thus the title Participation in Local Professional Societies. Two other secondary loadings indicate this type of physician also refers a large number of his patients to other physicians for consultation and advice and subscribes to an above-average number of professional journals. A slightly similar factor, Factor V, was found in the 1963 General Practitioner study.

The pattern of major variable loadings on Factor X rather clearly portrays a physician who places considerable emphasis on making himself available to his patients. The physician characterized by this factor makes numerous house calls, frequently meets his patients after office hours in his office or at the local hospitals to provide emergency treatment, and works longer hours than his general practitioner colleagues. An appropriate title, therefore, for this factor might be Availability to Patients. Overall, this pattern is quite similar to Factor O of the 1963 Urban General Practitioner study and Factor D of the 1963 Rural General Practitioner study.

Factor Z appears to deal with Professional Mobility. Its highest loading is on the criterion variable concerned with the average number of professional positions held per year since the physician started practicing medicine. Two other secondary loadings show that this type of doctor treats very few patients without charge and attends few national and regional professional society meetings. A similar factor, Factor X, was found in the 1963 Urban General Practitioner study.

The single highest loading on Factor BB describes a physician who voluntarily provides an above average amount of free medical care to local charitable institutions, leading to the title Medical Charity Work. Other secondary loadings indicate a tendency to consider psychological or psychosomatic factors in providing care to patients and, surprisingly, an above average income from the medical profession. A quite similar factor bearing the same title, Factor D, was found in the 1963 General Practitioner study.

Finally, Factor CC (reflected) had only two major variable loadings: age of attaining M.D. degree and the average number of non-medical speeches to layman groups. A suggested title therefore, for this factor might be Youthfulness in Getting Degree.

In summary, the factor analysis of the 80 criterion variables for this sample of general practitioners served to reduce the intercorrelation matrix to 30 factors or independent criterion dimensions. In comparing these 30 rotated factors with the 30 rotated factors of the 1963 General Practitioner study considerable congruency was found. Computed coefficients of congruency showed nine of the factors were highly congruent and eight of them were statistically similar enough to warrant the same titles. Moreover, an analytical description and interpretation of the remaining thirteen factors, which did not meet the statistical criterion of congruency, served to cause the authors to see enough similarities to give five of the factors the same titles as corresponding factors of the 1963 study and to note some obvious similarities in six other factors. In other words, it was felt that only two of the criterion factors of the present study bore no resemblance to any of the factors of the 1963 study.

The final step in handling the criteria data for this group of general practitioners was to assign every participating physician a standardized factor score for each of the 30 factors or dimensions of physician performance. These factor scores served as the criterion measures of on-the-job performance against which the predictors were validated (see Table XV for a listing of the factor titles and the intercorrelations of the factor scores).

Results. As with the Specialist study of Chapter VII, the validation of the BIM was begun by first computing biserial correlations between each of the item-alternatives of the BIM and each of the 25 factor scores. Next, a key of "acceptable" item-alternatives was developed for each criterion measure or factor (i.e., the accepted item-alternatives for every factor consisted of those that were responded to by at least 15 per cent of the participating general practitioners and which had a correlation of at least ±.15 with the factor scores of the factor being analyzed. Then, the accepted item-alternatives were weighted +1 or -1 in correspondence with the direction of their biserial correlations. The computer then returned to each subject's BIM responses and gave him a total score for each sub-score of the BIM based on the accepted and weighted item-alternatives. As such, every participating physician received five BIM scores for every factor or criterion measure. Finally these five scores were then correlated with their appropriate factor scores to yield indices of the BIM's validity.

Since the sample size of the present study was sufficiently large to allow both a concurrent validity study and a cross-validation study of the BIM, these two procedures were followed. As indicated in Chapter III, concurrent validities were based on keyed or accepted items of the entire sample. The so-derived concurrent validities are given in Table XVI. This table shows the validity coefficients for the four subscores of the BIM across the factor scores ranged from .39 to .74 with mean coefficients of .62, .49, .50, and .63, for the Parents, Home, and School Life, College Life, Adult Life, and Professional Life subscores, respectively. As expected, the Total Score measure correlated higher than the subscores with the factor scores, their range being from .69 to .84 with an average validity coefficient of .78. By and large, such results are quite comparable to those of the Specialist study of Chapter VII and somewhat lower than those of the Full-time Faculty study of Chapter V.

In the cross-validation study of the BIM the total sample was randomly divided into two samples of equal size and the keys were developed on one sample and applied to the other sample. The validity coefficients dropped again, as in the Faculty study, to a general zero-order magnitude. In fact, an inspection of Table XVII shows that the mean

Table XV
Intercorrelations Between Factor Score Measures of Physicians Performance:
General Practitioner Sample
(N=242)

No.	Title	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD
A	Orthodox Success Image	--																													
B	Group Clinic Practice	00	--																												
C	Hospital Staff Recognition	-01	-01	--																											
D	Attainment in Publications	01	00	00	--																										
E	Civic Participation	-02	03	-01	00	--																									
F	Size of Medical Practice	-01	02	01	01	-01	--																								
G	Keeping Abreast by Means of Postgraduate, Refresher, and Professional Society Groups	-03	-01	00	00	-02	00	--																							
H	Professional Recognition for Achievements	-03	01	-01	01	00	01	00	--																						
I	Socioeconomic Level of Patients	00	-01	00	-01	-01	00	03	00	--																					
J	Achievement in Education	-03	-03	03	00	-05	03	03	02	-04	--																				
K	Level of Medical Specialization	-03	02	01	00	00	-02	-01	02	01	00	--																			
L	Interviewer's Rating of Likeability	00	02	01	01	03	02	01	00	-04	05	-02	--																		
M	Keeping Abreast by Means of Journal Reading	01	00	01	00	-02	-01	00	-01	-02	03	02	-01	--																	
N	Self-Evaluated Contribution to Medicine	03	03	02	-01	00	-02	00	-03	00	-05	00	-01	00	--																
O	Established Medical Practice	-01	04	04	00	-01	00	00	02	02	04	-03	02	04	-02	--															
P	Keeping Abreast by Means of Drug Detail Men	00	02	-02	-02	00	01	-02	00	01	03	-01	-02	01	01	-01	--														
Q	Prolonged Postgraduate Training	01	01	02	00	-01	01	00	-01	-01	-01	00	03	00	01	00	-01	--													
R	Diagnostic Thoroughness	-01	00	06	00	-02	-01	-02	01	-02	04	-01	-04	-01	00	-01	02	00	--												
S	Late Attainment of M. D. Degree	-01	-01	-01	00	-01	02	00	01	01	02	01	00	00	01	00	00	01	-02	--											
T	Number of Nominations as a Preferred Consultant	01	02	-03	00	00	01	00	01	01	03	-01	-02	-02	01	-01	00	00	-01	01	--										
U	Medical Referring	01	-02	00	-01	00	02	02	01	00	-04	02	00	00	00	00	01	-01	02	00	01	--									
V	Participation in Local Professional Societies	00	01	01	-01	-02	-05	-01	-01	00	00	-01	-03	-02	-02	01	01	02	-04	-01	01	00	--								
W	Emphasis on Medical Equipment	01	-01	-02	00	03	06	00	00	04	-02	01	02	02	-01	01	-01	-02	06	01	-02	00	03	--							
X	Availability to Patients	01	-01	-01	00	05	00	01	01	00	-01	00	01	00	-01	01	01	00	00	00	01	00	00	01	--						
Y	Off-the-Job Socialization	-01	00	-02	00	-01	01	00	01	00	05	-01	01	01	02	00	-02	00	02	-01	-02	00	01	00	01	--					
Z	Professional Mobility	02	01	-01	00	01	-03	00	-02	00	-02	02	-02	-04	-01	02	02	00	-01	00	01	00	-04	01	00	03	--				
AA	Professional Stability	03	-05	-05	00	01	01	00	-02	-06	00	04	-01	-02	02	07	02	01	01	-01	01	-02	-02	02	-01	01	00	--			
BB	Medical Charity Work	-01	01	00	00	03	03	-01	01	01	-01	-01	02	02	-02	-03	-01	00	04	01	03	01	03	-03	01	-02	04	00	--		
CC	Youthfulness in Getting Degree	01	-02	-02	00	03	02	05	01	-04	00	00	-01	01	-02	00	02	-02	00	00	02	00	02	01	-02	01	00	-04	-01	--	
DD	Medical Consulting	-01	03	00	00	04	02	-01	-01	-01	00	-02	02	01	01	00	-01	00	-01	02	04	00	02	-01	-01	00	02	-04	-02	-03	--

Note: Decimals have been omitted.

Table XVI
Concurrent Validities Between BIM Scores and Criterion Factor Scores: General Practitioner Sample*
(N=242)

Factor Scores		BIM Scores				
No.	Title	Parents, Home, School Life	College Life	Adult Life	Professional Life	Total Score
A	Orthodox Success Image	60	49	52	60	75
B	Group Clinic Practice	68	53	54	64	81
C	Hospital Staff Recognition	66	46	45	68	80
D	Attainment in Publications	64	54	55	59	80
E	Civic Participation	64	49	54	72	81
F	Size of Medical Practice	65	44	48	59	80
G	Keeping Abreast by Means of Postgraduate, Refresher, and Professional Society Groups	68	46	54	58	79
H	Professional Recognition for Achievements	54	39	43	58	73
I	Socioeconomic Level of Patients	67	51	43	67	82
J	Achievement in Education	55	58	48	56	72
K	Level of Medical Specialization	65	52	42	74	84
L	Interviewer's Rating of Likeability	58	50	42	70	79
M	Keeping Abreast by Means of Journal Reading	63	43	48	67	80
N	Self-Evaluated Contribution to Medicine	57	48	48	60	73
O	Established Medical Practice	63	50	56	55	78
P	Keeping Abreast by Means of Drug Detail Men	63	44	55	68	78
Q	Prolonged Postgraduate Training	64	50	50	69	81
R	Diagnostic Thoroughness	60	45	42	56	69
S	Late Attainment of M.D. Degree	62	58	53	61	77
T	Number of Nominations as a Preferred Consultant	61	47	64	60	76
U	Medical Referring	67	43	50	65	77
V	Participation in Local Professional Societies	63	51	44	62	80
W	Emphasis on Medical Equipment	62	51	59	63	79
X	Availability to Patients	67	39	54	64	80
Y	Off-the-Job Socialization	63	49	47	58	77
Z	Professional Mobility	61	57	50	61	80
AA	Professional Stability	57	48	49	62	76
BB	Medical Charity Work	65	54	44	63	81
CC	Youthfulness in Getting Degree	62	57	70	66	82
DD	Medical Consulting	51	59	44	66	82

*Correlations reported are concurrent validities based on BIM keys which are not fixed for a given column. Instead, a new empirical key was built separately for each row or criterion.

Note: Decimals have been omitted.

Table XVII
Validity Coefficients Between Criteria Factor Scores and Criteria Predictors: General Practitioner Sample
(N=242)

Factor Scores		Predictors											
		BIM* (N=121)					GPA** (N=242)			MCAT** (N=242)			
No.	Title	Parents, Home, School Life	College Life	Adult Life	Professional Life	Total Score	Premedical School	1st 2 yrs. Med. School	Last 2 yrs. Med. School	Verbal	Quantitative	Society	Science
A	Orthodox Success Image	-24	19	14	09	07	-07	13	26	-07	-18	-10	03
B	Group Clinic Practice	-01	00	00	19	12	-01	11	01	02	-11	-13	-21
C	Hospital Staff Recognition	-01	-03	-07	-13	-13	16	-25	-07	-07	-08	-13	-20
D	Attainment in Publications	-06	07	20	09	10	-03	-01	-07	-06	-02	-07	-07
E	Civic Participation	-08	25	05	-05	01	-24	10	20	05	08	12	10
F	Size of Medical Practice	-02	-03	05	-13	-10	03	-09	05	38	10	13	16
G	Keeping Abreast by Means of Postgraduate, Refresher, and Professional Society Groups	11	06	16	-23	-03	-30	03	17	-03	02	-02	05
H	Professional Recognition for Achievements	-06	-13	-03	05	-02	03	01	-02	04	05	08	10
I	Socioeconomic Level of Patients	-05	04	-20	-07	-12	23	-07	-01	06	10	03	-03
J	Achievement in Education	-16	40	-07	03	09	74	97	95	11	17	11	08
K	Level of Medical Specialization	25	06	-09	18	23	-06	07	12	-12	-05	-14	-15
L	Interviewer's Rating of Likeability	-10	17	-14	06	-02	-10	-02	19	-02	-03	-13	-06
M	Keeping Abreast by Means of Journal Reading	07	-01	03	-05	01	-02	-05	-04	-08	07	-05	14
N	Self-Evaluated Contribution to Medicine	-05	-07	-01	03	-01	08	13	08	13	-08	-01	08
O	Established Medical Practice	03	03	16	07	14	-08	01	-06	-05	03	03	13
P	Keeping Abreast by Means of Drug Detail Men	16	-14	24	03	15	-06	-03	08	-13	09	-08	-07
Q	Prolonged Postgraduate Training	-07	13	12	11	11	08	-03	-05	02	24	03	18
R	Diagnostic Thoroughness	-07	-02	05	10	04	-21	09	06	-02	-03	12	04
S	Late Attainment of M.D. Degree	19	09	10	-07	12	-06	-02	-01	08	06	-05	05
T	Number of Nominations as a Preferred Consultant	-10	02	05	-07	-08	-07	04	17	-13	-15	-15	00
U	Medical Referring	13	-26	06	-16	-11	03	07	-15	-22	-18	-26	-10
V	Participation in Local Professional Societies	-03	05	02	05	05	-02	02	05	-08	-10	-13	-16
W	Emphasis on Medical Equipment	04	-04	04	07	06	-01	-03	-02	-02	-02	01	-01
X	Availability to Patients	12	-07	22	-01	10	06	09	-07	-10	10	-03	11
Y	Off-the-Job Socialization	09	13	-01	11	-01	-01	-15	-02	-24	-27	-25	-27
Z	Professional Mobility	-09	11	03	-03	-02	17	-03	-03	-07	-18	-11	-21
AA	Professional Stability	-06	01	07	-09	-06	14	-09	-02	-12	-31	-11	-11
BB	Medical Charity Work	-18	04	-04	00	-10	05	-04	13	-05	02	-03	-05
CC	Youthfulness in Getting Degree	-02	31	23	-08	08	27	-09	-24	-02	07	00	01
DD	Medical Consulting	-14	24	-16	07	-03	01	02	-02	12	00	04	02

*Correlations reported are cross-validities based on a separate empirical key for each criterion or row.

**Correlations reported are predictive validities.

Note: Decimal points are omitted.

of the validity coefficients across all of the thirty factor scores was -.01 for the Parents, Home, and School Life score, .06 for the College Life score, .04 for the Adult Life score, .01 for the Professional Life score, and .02 for the Total Score measure. Thus, the general picture is to the effect that the BIM failed to predict the domain of physician performance that was encompassed by the present criterion factors.

However, if one turns to the specific or individual validities of Table XVII several statistically significant relationships were obtained. For example, the Parents, Home, and School Life score of the BIM generally correlated negatively with the factor scores (20 of the 30 validity coefficients were negative in sign). In addition, this BIM score correlated significantly negative ($p < .01$) with the factor scores of Factor A, Orthodox Success Image, and significantly positive with the factor scores of Factor K, Level of Medical Specialization. The College Life score correlated significantly (and, with one exception, positively) with the five following criterion factors: Factor E (Civic Participation), Factor J (Achievement in Education), Factor U (Medical Referring), Factor CC (Youthfulness in Getting Degree), and Factor DD (Medical Consulting). Of the validity coefficients between the Adult Life score and the factor scores only the following two were significant: Factor P (Keeping Abreast by Means of Drug Detail Men) and Factor CC (Youthfulness in Getting Degree). The Professional Life score yielded only a single significant validity coefficient and that was with Factor G (Keeping Abreast by Means of Postgraduate, Refresher, and Professional Society Courses). Similarly, the Total Score measure only correlated significantly with the factor scores of Factor K (Level of Medical Specialization). Therefore, one could say that the BIM was not a total predictive failure since nine of the thirty dimensions of physician performance were successfully predicted in this cross-validation study.

Turning now to the three GPA predictors, very similar results were found. Specifically, the computed predictive validities, based on the total sample of 242 general practitioners, has an average correlation across criteria of .02 for Premedical School GPA, .03 for GPA for the First Two Years of Medical School, and .05 for GPA for the Last Two Years of Medical School. As expected, all three measures correlated very high (.74, .97, and .95) with Factor J, Achievement in Education (see Table XVII). In addition, some significant validities ($p < .01$) were found between the individual predictors (some, but not all of which were in the expected direction) and the individual factors. First, Premedical School GPA correlated significantly with the factor scores of Factor E (Civic Participation), Factor G (Keeping Abreast by Means of Postgraduate, Refresher, and Professional Society Courses), Factor I (Socioeconomic Level of Patients), Factor R (Diagnostic Thoroughness), and Factor CC (Youthfulness in Getting Degree). Second, GPA for the First Two Years of Medical School correlated significantly with Factor C (Hospital Staff Recognition). And third, GPA for the Last Two Years of Medical School correlated significantly with Factor A (Orthodox Success Image), Factor E (Civic Participation), Factor L (Interviewer's Rating of Likeability), and Factor CC (Youthfulness in Getting Degree). Thus, these three measures could be used to predict nine of the criteria factors, five of which were also predicted by one of the BIM measures.

Concerning the MCAT, its four measures, Verbal, Quantitative, Society, and Science, had very similar average predictive validities across the 30 criteria as did the GPA measures, namely, -.03, -.02, -.04, and -.01, respectively. Interestingly, 55 per cent of all of these individual predictive validities were negative in sign (see Table XVII). This corresponds to 44 per cent for the BIM scores and 52 per cent for the GPA measures. Disregarding the direction or sign of the validities and only considering their magnitudes, the following significant ($p < .01$) individual relationships were obtained with the MCAT: (1) the Verbal score correlated significantly with Factor F (Size of Medical Practice), Factor U (Medical Referring), and Factor Y (Off-the-Job Socialization); (2) the Quantitative score correlated significantly with Factor A (Orthodox Success Image), Factor Q (Prolonged Postgraduate Training), Factor U (Medical Referring), Factor Y (Off-the-Job Socialization); and (4) the Science score correlated significantly with Factor B (Group or Clinic Practice), Factor C (Hospital Staff Recognition), Factor Q (Prolonged Postgraduate Training), Factor Y (Off-the-Job Socialization), and Factor Z (Professional Mobility). All totaled, then, the scores of the MCAT successfully predicted ten of the thirty criteria, though the large majority of these significant correlations were negative ones.

Looking now at the total or composite picture, it can be seen from Figure IV that 20, or 2/3, of the 30 criteria have been successfully predicted by one or more of the twelve predictors. Factor A was predicted by the BIM's Parents, Home, and School Life score, GPA for the Last Two Years of Medical School, the MCAT's Quantitative score; Factor B by the Quantitative score; Factor C by GPA for the First Two Years of Medical School and the MCAT's Science score; Factor E by the BIM's College Life score, Premedical GPA, and GPA for the Last Two Years of Medical School; Factor F by the MCAT's Verbal score; Factor G by the BIM's Professional Life score and Premedical GPA; Factor I by Premedical GPA; Factor J by the BIM's College Life score and all three GPA measures; Factor K by the BIM's Parents, Home, and School Life and Total Score measures; Factor L by GPA for the Last Two Years of Medical School; Factor P by the BIM's Adult Life score; Factor Q by the MCAT's Quantitative and Science scores; Factor R by Premedical GPA; Factor T by the MCAT's Verbal score; Factor U by College Life, Quantitative, and Society; Factor Y by all four of the MCAT's measures; Factor Z by the MCAT's Quantitative and Science; Factor AA by Quantitative; Factor CC by College Life, Adult Life, Premedical GPA, and GPA for the Last Two Years of Medical School; and Factor DD by College Life. Note that every predictor was valuable in the sense that it predicted at least one of the criteria.

Discussion and Summary. As compared with the Specialist study of Chapter VII, the results of the present study of twelve predictors of thirty criteria of on-the-job general practitioner performance was considerably more encouraging though the direction of the relationships are, in some cases, troublesome. For one, the reliability of the criteria or factors was much more adequate. Computed coefficients of congruency between the thirty criteria factors of the 1963 General Practitioner study and the thirty factors of the present investigation indicated seventeen of the factors were quite similar. Moreover, analytical interpretations of the remaining thirteen factors showed enough similarities to cause the authors to give five of the factors the same titles as corresponding factors of the 1963 study and to note some obvious similarities in six other

Figure IV
Statistically Successful Predictors of Criteria:
General Practitioner Sample

Criterion Factors		Predictors											
		BIM					GPA			MCAT*			
No.	Title	Parents, Home School Life	College Life	Adult Life	Professional Life	Total Score	Premedical School	1st 2 yrs. Med. School	Last 2 yrs. Med. School	Verbal	Quantitative	Society	Science
A	Orthodox Success Image	-							+		-		
B	Group or Clinic Practice												-
C	Hospital Staff Recognition							-					-
D	Attainment in Publications												
E	Civic Participation		+				-		+				
F	Size of Medical Practice									+			
G	Keeping Abreast by Means of Postgraduate, Refresher, and Professional Society Groups				-		-						
H	Professional Recognition for Achievements												
I	Socioeconomic Level of Patients						+						
J	Achievement in Education		+				+	+	+				
K	Level of Medical Specialization	+				+							
L	Interviewer's Rating of Likeability								+				
M	Keeping Abreast by Means of Journal Reading												
N	Self-Evaluated Contribution to Medicine						-						
O	Established Medical Practice												
P	Keeping Abreast by Means of Drug Detail Men			+									
Q	Prolonged Postgraduate Training										+		+
R	Diagnostic Thoroughness						-						
S	Late Attainment of M.D. Degree												
T	Number of Nominations as a Preferred Consultant									-			
U	Medical Referring		-								-	-	
V	Participation in Local Professional Societies												
W	Emphasis on Medical Equipment												
X	Availability to Patients												
Y	Off-the-Job Socialization									-	-	-	-
Z	Professional Mobility										-		-
AA	Professional Stability										-		
BB	Medical Charity Work												
CC	Youthfulness in Getting Degree		+	+			+		-				
DD	Medical Consulting		+										

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*The validation results for the MCAT are the most troublesome in this figure. Out of the 120 validity coefficients, 16 were significantly greater than zero, but 13 of these 16 significant validities were negative. The high intercorrelations among the four subtests of the MCAT (see Tables I, IX, and XVIII) also are troublesome on two counts: (1) ideally, subtest scores should be as unrelated as possible to maximize new information and combined predictive power, and (2) high intercorrelations, especially as found on the 242 general practitioners in Table IX where all but one of the intercorrelations are between .57 and .75, argue strongly against much restriction of range in these scores on these samples. Any corrections for restriction of range on the above general practitioner sample would yield even higher intercorrelations and would in all likelihood, still lead to the conclusion that the large majority of the significant validities for the MCAT against physician performance were negative.

factors. This strongly suggests that if the present factor analysis of the eighty criterion measures had been designed to maximize factorial similarity with the 1963 factor analysis, even more statistical congruency would have been found.

For another, twenty or two-thirds of the thirty criteria factors were found to be significantly related to one or more of the twelve predictor measures. Moreover, every predictor correlated significantly with at least one of criteria factors. This not only emphasizes the value of all of the predictors, but it also leads to still another plea for vigorous research with a large variety of other potential predictors of physician performance. Most of the significant validities were in the .20's. Thus, even when four or five of the predictors were hitting the same criterion, considerable variance was still unaccounted for. Potentially, other predictors could account for at least part of this remaining variance. Nevertheless, a significant first step has been made and should be pursued further.

Chapter VII

Predictors of Professional Performance in Specialty Practice

One relatively recent adjustment of the medical profession to the rapid expansion of knowledge in techniques, pharmacology, and nearly every sphere of medicine has been an increasing trend toward specialization. Compared with 1931 when only 16 per cent of the private practitioners were specialists, fully half of the practitioners today are in one of the major areas of medical specialization (Peterson, 1963). Moreover, this growing body of medical specialists represents a quite highly selected group in that only the "most promising" students are encouraged to enter the training programs of the medical college hospitals which are prerequisites to certification in one of the specialties. By and large, these most promising students are those of higher rank in academic studies (Peterson, 1963). These students in turn are those who have survived the screening tests, hurdles, or devices of the medical school selection committees.

Thus, once again we encounter the assumption that only those who possess the abilities and attributes measured by the selection batteries and medical school grades are those who deserve the opportunity to practice medicine, in this case specialty medicine. And this is despite the fact that little research has been presented to support this assumption (Peterson, Andrews, Spain, & Greenberg, 1956; Richards, Taylor, & Price, 1962). Obviously, then, considerable research is warranted to test this assumption that such selection devices have prognostic value for on-the-job clinical excellence. In the present chapter, an effort is made to explore the predictive effectiveness of some of these selection techniques for practice in specialty medicine.

Subjects. The population from which the present sample was drawn consisted of the physicians practicing in the State of Utah who had passed at least one of the American Board Specialty Certification examinations (N=372) and alumni of the University of Utah College of Medicine who were also certified by one of the American Boards but who were practicing outside of Utah (N=185). From this population of 557 certified specialists, 207 or 37% were studied in detail and comprised the present sample. Of these 207 specialists, 58 were Utah alumni practicing outside of Utah.

Predictors. Using the same rationale as that of Chapters V and VI in selecting predictors of professional performance for physicians in academic medicine and general practice, the present study included both medical school selection techniques and measures of medical school achievement as predictors of measures of performance in specialty practice. As such, scores on the following indices were collected on the present specialists and in the same manner as that described in Chapters V and VI: (1) Premedical GPA, (2) GPA for the First Two Years of Medical School, (3) GPA for the Last Two Years of Medical School, the MCAT scores on (4) Verbal, (5) Quantitative, (6) Society, and (7) Science, and the (8) Parents, Home, and School Life, (9) College Life, (10) Adult Life, (11) Professional Life, and (12) Total Score measures derived from the BIM. These twelve measures comprised the predictors of the present study. Computed t-tests between the 149 Utah specialists and the 58 non-Utah specialists on these twelve predictors failed to uncover any significant differences between these subsamples. Consequently, the total sample was used hereafter.

The intercorrelations between the three GPA and the four MCAT scores on this total sample are given in Table XVIII. Concerning the GPA predictors, this table shows that the Premedical GPA correlated moderately high (.33) with GPA for the first two years of medical school and then dropped to .14 for GPA for the last two years of medical school. This trend of diminishing returns was noted in Chapter I from the results of other researchers. Surprisingly, the obtained correlation between GPA for the first two years of medical school and the last two years of medical school was .76. This suggests that medical school performance is relatively stable for those students who eventually go into specialty practice. Moreover, correlational comparisons between the GPA measures and the MCAT measures were all of an essentially zero-order magnitude. This is in general agreement with the findings of others as reviewed in Chapter I. Finally, of interest was the relatively high intercorrelations among the MCAT scores, thus implying that the test is a fairly homogeneous measure and could be shortened without greatly altering its predictive efficiency. As a short-range predictor of medical school grades, nine of its twelve validities were negligible; however, its Quantitative score correlated .20 with grades in the first two years of medical school (see Table XVIII). This positive finding for the MCAT was somewhat counterbalanced by the finding that all of its validities for the last two years of medical school were almost negligible and all had negative signs.

Table XVIII
Intercorrelations Between Predictors of Physician Performance:
Specialist Sample*
(N=207)

	1	2	3	4	5	6
1. GPA: Premedical School	---					
2. GPA: First 2 yrs. Medical School	.33	---				
3. GPA: Last 2 yrs. Medical School	.14	.76	---			
4. MCAT: Verbal	.14	-.04	-.12	---		
5. MCAT: Quantitative	.00	.20	-.02	.38	---	
6. MCAT: Social	.08	.03	-.03	.51	.47	---
7. MCAT: Science	.07	.07	-.08	.31	.47	.40

*It is noted that the intercorrelations of the BIM scores with the GPA and MCAT scores are omitted. Since the item analysis procedure for the BIM would result in keying different items for the different criteria, such intercorrelations would be vast in number and were not computed.

Criteria. As with the Full-time Faculty study of Chapter V and the General Practitioner Study of Chapter VI, the criteria of this study was based on the authors' previous research on Performance Measures of Physicians (Price, Taylor, Richards, & Jacobsen, 1963). In that 1963 investigation 80 scores relevant to physician performance were collected on 190 certified Utah specialists. Those data were then factor analyzed and rotated to a final solution, resulting in 29 factors or independent dimensions of specialty performance.

In the present specialists study, the same criteria as that of the 1963 study were collected and analyzed. Since the Utah specialists of the present sample (N=149) had been subjects in the 1963 study, their criterion data from that study was utilized in the present investigation. For the non-Utah specialists (N=58) these data were collected by mail. In so doing, a personal letter from the senior author, explaining the study and requesting the addressee's cooperation, was sent to every physician in the alumni population outside of Utah (N=185). Those physicians that responded affirmatively to the request were then sent a revised form of the 1963 Specialist Interview Form for their completion and return. The returned forms were then scored in the same manner as in the 1963 study. A detailed summary of these data is presented in Figure V.

As implied above, the criterion data of the Utah and non-Utah specialists were pooled and treated as a homogeneous sample in the analysis. However, t-tests between the Utah and non-Utah subjects on the 80 criterion variables showed 16 significant differences worthy of mention (see Table XIX). Specifically, tests of the significance of the difference between mean scores on the following criterion variables were found to be statistically significant ($p < .01$): (1) Number of years spent in residency, (2) quality of scientific and professional societies to which membership is held, (3) number of self-reported contributions made to medicine, (4) number of research projects with which involved, (5) number of scientific and professional society meetings attended, (6) number of postgraduate courses taken, (7 and 8) number of both formal and informal medical consultations the physician is called in for, (9) the percentage of patients on which consultations are requested from other physicians, (10) the amount of time spent with patients to explain diagnoses, (11) level of hospital responsibilities, (12) value of office equipment, (13) number of memberships in social and avocational organizations, (14) the number of common, usual, or stereotyped responses elicited when asked to list the personal characteristics which contribute to success in medicine, (15) years of experience, and (16) the proportion of physicians within each group that are in individual, rather than some form of group practice.

Significantly, the difference yielding the greatest t-value of these tests was that on the variable measuring the number of years of professional experience of the physicians. This was expected and could account for most, if not all of the significant differences obtained. The College of Medicine of the University of Utah has been awarding the M.D. degree only since 1944 when it changed from a two-year to a four-year college. Therefore, the non-Utah sample, which was drawn from alumni of the University's College of Medicine, would be considerably younger and less experienced than the Utah sample which was drawn from practicing Utah physicians, many of whom received their M.D. degree prior to 1944, and from colleges of medicine other than Utah. Moreover, with increasing experience and training one is naturally exposed to and encouraged to engage in more professional activities. As a consequence, one would expect professional seniority alone to influence, if not account for, the differences mentioned in (2), (3), (4), (5), (6), (7), (8), (9), (11), (12), and (13) above. To check this possibility, the variable measuring

Figure V
Title and Source for Each Criterion Variable for Specialist Sample
(N=207)

Criterion Variables*		Source	
No.	Title	Utah Specialists (N=149)	Non-Utah Specialists (N=58)
1	Number of Times Nominated as Outstanding Contributor by Urban Specialist Colleagues	Colleagues	Missing Data**
2	Number of Times Nominated as Preferred Consultant by Urban Specialist Colleagues	Colleagues	Missing Data
3	Number of Nominations as Outstanding Contributor or Preferred Consultant by General Practitioners	Personal Interview	Missing Data
4	Number of Times Nominated as Outstanding Contributor by College of Medicine Faculty	Personal Interview	Missing Data
5	Rating of "Clinical Excellence" by Medical College Department Head	Department Head	Missing Data
6	Number of Different Residency Hospitals	Personal Interview	Mailed Interview Form
7	Number of Years Spent in Residency	Personal Interview	Mailed Interview Form
8	Judged Quality of National Board Certification	Expert Judges	Expert Judges
9	Present College of Medicine Clinical Faculty Rank	Official Records	Mailed Interview Form
10	Mobility Rate in Professional Positions	Personal Interview	Mailed Interview Form
11	Total Number of Listings in Honorary Compendiums	Compendiums	Compendiums
12	Gross Income from Medical Profession	Personal Interview	Mailed Interview Form
13	Number of Current Memberships in Scientific and Professional Societies	Personal Interview	Mailed Interview Form
14	Average Judged Quality of Societies in Which Membership is Current	Personal Interview & Expert Judges	Mailed Interview Form & Expert Judges
15	Overall Occupational Satisfaction	Questionnaire	Questionnaire
16	Number of Times During Career Invited to Serve as Editor of Scientific or Professional Journal	Personal Interview	Mailed Interview Form
17	Number of Times During Career Invited to Serve on Scientific and Professional Advisory Boards	Personal Interview	Mailed Interview Form
18	Average Judged Quality of Scientific and Professional Awards Received During Career	Personal Interview & Expert Judges	Mailed Interview Form & Expert Judges
19	Self-Reported Number of Contributions Made to Medicine	Personal Interview	Mailed Interview Form
20	Average Judged Quality of Self-Reported Contributions Made to Medicine	Personal Interview & Expert Judges	Mailed Interview Form & Expert Judges
21	Self-Reported Number of Non-Medical Contributions to Society	Personal Interview	Mailed Interview Form
22	Total Number of Papers Represented at Scientific and Professional Meetings During Career	Personal Interview	Mailed Interview Form
23	Average Number of Journal Publications Per Year Since Receiving M.D.	Personal Interview & Compendiums	Mailed Interview Form & Compendiums
24	Average Level of Contribution to Publications as Indicated by Senior vs. Junior Authorship Status	Personal Interview & Compendiums	Missing Data
25	Number of Research Projects with Which Involved During Career	Personal Interview	Mailed Interview Form
26	Number of Scientific and Professional Journals Reviewed Regularly	Personal Interview	Mailed Interview Form
27	Number of Subscriptions to Scientific and Professional Journals	Personal Interview	Mailed Interview Form
28	Number of Articles in Scientific and Professional Journals Read in Detail Each Month	Personal Interview	Mailed Interview Form
29	Average Number of Society Meetings Attended Annually	Personal Interview	Mailed Interview Form
30	Number of Postgraduate Courses Taken During Career	Personal Interview	Mailed Interview Form
31	Number of Refresher Courses Taken During Career	Personal Interview	Mailed Interview Form
32	Physician's Evaluation of Usefulness of Drug Detail Men	Personal Interview	Mailed Interview Form
33	Extent of Physician's Experimental Use of Drugs Provided by Drug Detail Men	Personal Interview	Mailed Interview Form
34	Number of Techniques Other Than Journals, Meetings, and Drug Detail Men Used in Keeping Abreast	Personal Interview	Mailed Interview Form
35	Average Number of Formal Medical Consultations Called Into Monthly	Personal Interview	Mailed Interview Form
36	Average Number of Informal Medical Consultations Called Into Monthly	Personal Interview	Mailed Interview Form
37	Percentage of Patients on Which Consultations are Requested	Personal Interview	Mailed Interview Form
38	Number of Patients Seen Per Day	Personal Interview	Mailed Interview Form
39	Average Amount of Time Spent with Patients on First Visit	Personal Interview	Mailed Interview Form
40	Average Amount of Time Spent in Explaining Diagnoses to Patients	Personal Interview	Mailed Interview Form
41	Proportion of Office Patients Treated Without Charge	Personal Interview	Mailed Interview Form
42	Proportion of Office Patients That Fail to Pay Physician for Services Rendered	Personal Interview	Missing Data
43	Self-Estimated Average Socioeconomic Level of Patients	Personal Interview	Mailed Interview Form
44	Degree to Which Physician Adheres to Patient Appointment Schedule	Personal Interview	Mailed Interview Form
45	Average Number of House Calls Made Per Week	Personal Interview	Mailed Interview Form
46	Degree to Which Physician Considers Psychological Factors in Diagnoses	Personal Interview	Mailed Interview Form
47	Average Number of Hours Per Week Devoted to Medical Practice	Personal Interview	Mailed Interview Form
48	Average Number of Hospitalized Patients	Personal Interview	Mailed Interview Form
49	Number of Hospitals in Which Physician Works	Personal Interview	Mailed Interview Form
50	Average Judged Quality of Hospitals in Which Physician Works	Personal Interview & Expert Judges	Missing Data
51	Number of Hospitals in Which Physician Maintains Courtesy Privileges	Personal Interview	Mailed Interview Form
52	Average Judged Quality of Hospitals in Which Physician Maintains Courtesy Privileges	Personal Interview & Expert Judges	Missing Data
53	Number of Formal Responsibilities Physician Has in Hospitals	Personal Interview	Mailed Interview Form
54	Average Judged Quality of Hospital Responsibilities	Personal Interview & Expert Judges	Missing Data
55	Self-Estimated Value of Office Equipment	Personal Interview	Mailed Interview Form
56	Number of M.D. Assistants on Physician's Ancillary Staff	Personal Interview	Mailed Interview Form
57	Number of Nurses on Physician's Ancillary Staff	Personal Interview	Mailed Interview Form
58	Number of Technicians on Physician's Ancillary Staff	Personal Interview	Mailed Interview Form
59	Number of Clerical, Administrative, and Janitorial Workers on Physician's Ancillary Staff	Personal Interview	Mailed Interview Form
60	Average Number of Speeches on Medical Topics to Laymen Groups Per Year	Personal Interview	Mailed Interview Form
61	Average Amount of Vacation Taken Annually	Personal Interview	Mailed Interview Form
62	Extent to Which Physician Plans and Maintains Leisure Time Activities	Personal Interview	Mailed Interview Form
63	Number of Current Memberships in Social and Avocational Organizations	Personal Interview	Mailed Interview Form
64	Number of Current Memberships in Civic and Political Organizations	Personal Interview	Mailed Interview Form
65	Characteristics Physician Considers Important for Success in Medicine: Number of "Common" Responses	Personal Interview	Mailed Interview Form
66	Characteristics Physician Considers Important for Success in Medicine: Number of "Uncommon" Responses	Personal Interview	Mailed Interview Form
67	Characteristics Physician Considers Important for Success in Medicine: "Commonness" of Responses Elicited	Personal Interview	Mailed Interview Form
68	Self-Rating of Success in Medicine	Personal Interview	Missing Data
69	Expert Panel Rating of Overall Performance Based on All Available Information	Expert Judges	Missing Data
70	Interviewer Rating of Condition of Physician's Office	Project Interviewer	Missing Data
71	Interviewer Rating of Likeability	Project Interviewer	Missing Data
72	Interviewer Rating of Physician's Involvement in This Project	Project Interviewer	Missing Data
73	Age at Which Received M.D.	Personal Interview & Compendiums	Mailed Interview Form & Compendiums
74	Number of Years Between Receiving M.D. and Receiving National Board Certification	Personal Interview & Compendiums	Mailed Interview Form & Compendiums
75	Years of Experience Since Receiving M.D.	Personal Interview & Compendiums	Mailed Interview Form & Compendiums
76	Individual Practice Rather Than Group, Clinic or Hospital Practice	Personal Interview	Mailed Interview Form
77	Hospital Practice Rather Than Individual, Group, or Clinic Practice	Personal Interview	Mailed Interview Form
78	Undergraduate Grade Point Average	Official Transcripts	Official Transcripts
79	Grade Point Average for First Two Years of Medical School	Official Transcripts	Official Transcripts
80	Grade Point Average for Last Two Years of Medical School	Official Transcripts	Official Transcripts

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*A detailed summary of the procedures employed in scoring these variables is presented in Performance Measures of Physicians (Price, Taylor, Richards, & Jacobsen, 1963, pp. 140-162).

**In cases of no data, it was either not possible or it was considered inappropriate to gather such data through the mail.

Table XIX
Tests for Significance of Difference Between Means of Utah Specialists (N=149) and Non-Utah Specialists (N=58) on Criterion Variables

Criterion Variables		t*
No.	Title	
1	Number of Times Nominated as Outstanding Contributor by Urban Specialist Colleagues	**
2	Number of Times Nominated as Preferred Consultant by Urban Specialist Colleagues	**
3	Number of Nominations as Outstanding Contributor or Preferred Consultant by General Practitioners	**
4	Number of Times Nominated as Outstanding Contributor by College of Medicine Faculty	**
5	Rating of "Clinical Excellence" by Medical College Department Head	**
6	Number of Different Residency Hospitals	1.92
7	Number of Years Spent in Residency	4.59***
8	Judged Quality of National Board Certification	1.67
9	Present College of Medicine Clinical Faculty Rank	**
10	Mobility Rate in Professional Positions Since Receiving M. D.	2.28
11	Total Number of Listings in Honorary Compendiums	2.16
12	Gross Income from Medical Profession	0.13
13	Number of Current Memberships in Scientific and Professional Societies	2.39
14	Average Judged Quality of Societies in Which Membership is Current	6.25***
15	Overall Occupational Satisfaction	1.74
16	Number of Times During Career Invited to Serve as Editor of Scientific or Professional Journal	0.59
17	Number of Times During Career Invited to Serve on Scientific and Professional Advisory Boards	0.53
18	Average Judged Quality of Scientific and Professional Awards Received During Career	0.50
19	Self-Reported Number of Contributions Made to Medicine	7.43***
20	Average Judged Quality of Self-Reported Contributions Made to Medicine	1.22
21	Self-Reported Number of Non-Medical Contributions to Society	0.41
22	Total Number of Papers Presented at Scientific and Professional Meetings During Career	1.14
23	Average Number of Journal Publications Per Year Since Receiving M. D.	1.68
24	Average Level of Contribution to Publications as Indicated by Senior vs. Junior Authorship Status	**
25	Number of Research Projects with Which Involved During Career	3.89***
26	Number of Scientific and Professional Journals Reviewed Regularly	2.46
27	Number of Subscriptions to Scientific and Professional Journals	0.30
28	Number of Articles in Scientific and Professional Journals Read in Detail Each Month	0.95
29	Average Number of Society Meetings Attended Annually	3.73***
30	Number of Postgraduate Courses Taken During Career	2.63***
31	Number of Refresher Courses Taken During Career	1.03
32	Physician's Evaluation of Usefulness of Drug Detail Men	1.21
33	Extent of Physician's Experimental Use of Drugs Provided by Drug Detail Men	1.42
34	Number of Techniques Other Than Journals, Meetings, and Drug Detail Men Used in Keeping Abreast	1.13
35	Average Number of Formal Medical Consultations Called Into Monthly	3.34***
36	Average Number of Informal Medical Consultations Called Into Monthly	4.63***
37	Percentage of Patients on Which Consultations Are Requested	6.24***
38	Number of Patients Seen Per Day	1.15
39	Average Amount of Time Spent with Patients on First Visit	1.87
40	Average Amount of Time Spent in Explaining Diagnoses to Patients	3.45***
41	Proportion of Office Patients Treated Without Charge	1.99
42	Proportion of Office Patients That Fail to Pay Physician for Services Rendered	**
43	Self-Estimated Average Socioeconomic Level of Patients	1.38
44	Degree to Which Physician Adheres to Patient Appointment Schedule	0.05
45	Average Number of House Calls Made Per Week	1.20
46	Degree to Which Physician Considers Psychological Factors in Diagnoses	1.30
47	Average Number of Hours Per Week Devoted to Medical Practice	1.03
48	Average Number of Hospitalized Patients	0.06
49	Number of Hospitals in Which Physician Works	2.45
50	Average Judged Quality of Hospitals in Which Physician Works	**
51	Number of Hospitals in Which Physician Maintains Courtesy Privileges	1.70
52	Average Judged Quality of Hospitals in Which Physician Maintains Courtesy Privileges	**
53	Number of Formal Responsibilities Physician Has in Hospitals	4.03***
54	Average Judged Quality of Hospital Responsibilities	**
55	Self-Estimated Value of Office Equipment	3.20***
56	Number of M. D. Assistants on Physician's Ancillary Staff	1.60
57	Number of Nurses on Physician's Ancillary Staff	1.94
58	Number of Technicians on Physician's Ancillary Staff	0.17
59	Number of Clerical, Administrative, and Janitorial Workers on Physician's Ancillary Staff	0.07
60	Average Number of Speeches on Medical Topics to Laymen Groups Per Year	0.57
61	Average Amount of Vacation Taken Annually	0.30
62	Extent to Which Physician Plans and Maintains Leisure Time Activities	0.73
63	Number of Current Memberships in Social and Avocational Organizations	4.20***
64	Number of Current Memberships in Civic and Political Organizations	0.27
65	Characteristics Physician Considers Important for Success in Medicine: Number of "Common" Responses	6.58***
66	Characteristics Physician Considers Important for Success in Medicine: Number of "Uncommon" Responses	1.50
67	Characteristics Physician Considers Important for Success in Medicine: "Commonness" of Responses Elicited	1.30
68	Self-Rating of Success in Medicine	**
69	Expert Panel Rating of Overall Performance Based on All Available Information	**
70	Interviewer Rating of Condition of Physician's Office	**
71	Interviewer Rating of Likeability	**
72	Interviewer Rating of Physician's Involvement in This Project	**
73	Age at Which Received M. D.	1.05
74	Number of Years Between Receiving M. D. and Receiving National Board Certification	0.70
75	Years of Experience Since Receiving M. D.	10.99***
76	Individual Practice Rather Than Group, Clinic or Hospital Practice	3.13***
77	Hospital Practice Rather Than Individual, Group, or Clinic Practice	1.91
78	Undergraduate Grade Point Average	2.48
79	Grade Point Average for First Two Years of Medical School	1.22
80	Grade Point Average for Last Two Years of Medical School	0.70

*Entries represent absolute differences between groups without regard to direction of the differences
**Criterion measures on which data for one of the groups is missing
***$p < .01$

years of professional experience was "partialled out" of the other 79 variables and the t-tests were recomputed. This resulted in significant differences for only four of the variables, namely, (1), (10), (14), and (16) mentioned above. Concerning (1), number of years spent in residency, this difference could be explained by the trend to increase residency requirements. Thus, one would anticipate a younger, less experienced sample of physicians to have had more residency than an older, more experienced sample. Concerning the finding of (10), which indicates that Utah physicians spend less time than the non-Utah physicians explaining their diagnoses to their patients, only tentative suggestions could be offered; i.e., perhaps the younger non-Utah physicians have had this aspect of practice emphasized in their training as a result of recent developments on the psychological aspects of medicine, or perhaps the younger non-Utah physicians simply have more time than their busier, more established Utah colleagues to spend with their patients. Similar, inconclusive rationalizations could be presented for the differences mentioned in (14) and (16). However, it is felt that such speculation is not necessary or warranted. Most of the differences can be accounted for by the seniority factor which is not critical to the major concern of this chapter, namely, quality of practice as a specialist. This general type of difference on these criteria would tend to show criterion scores added below the mean as the non-Utah sample was added to the Utah sample.

Description of the Factor Study on the Present Combined Specialist Sample. As with the Full-time Faculty study and the General Practitioner study, the factor analyses of the corresponding 1963 and present studies yielded quite comparable factors (see Tables XX, XXI, and XXII for the eigenvalues, unrotated factor matrix, and rotated factor matrix, respectively, of the present study). In fact, fourteen of the twenty-five rotated factors obtained in the present study were felt to be similar enough in their factor loadings to fourteen rotated factors of the 1963 Specialist study to warrant their being given the same titles:

1963 Study	Present Study	
R	C	Keeping Abreast by Means of Drug Detail Men
X	D	Interviewer's Rating of Likeability
F	E	Prolonged Residency Training
CC	G	Achievement in Education[19]
M	H	Attainment in Publications
A	I	Professional Recognition for Achievements
P	J	Keeping Abreast by Means of Journal Reading
E	K	Medical Charity Work
N	M	Self-Evaluated Contribution to Society
Y	N	Orthodox Success Image
L	O	Attainment in Research
K	T	Medical Consulting and Liason
Q	V	Keeping Abreast by Means of Refresher Courses
V	X	Leisure Planning

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[19] Again academic performances (as measured by three grade point averages) were found to be dimensionally independent from practically all professional accomplishments (as measured by 77 scores on professional career performances of specialists).

Table XX
Eigenvalues and Cumulative Proportion of Variance Accounted for: Specialist Sample
(N=207)

Factor	Eigenvalue	Cumulative Proportion of Variance
A	7.56	.09
B	6.59	.18
C	4.88	.24
D	3.35	.28
E	3.21	.32
F	2.67	.35
G	2.31	.38
H	2.02	.41
I	2.01	.43
J	1.75	.45
K	1.73	.48
L	1.65	.50
M	1.59	.52
N	1.54	.54
O	1.44	.55
P	1.41	.57
Q	1.32	.59
R	1.27	.60
S	1.24	.62
T	1.18	.63
U	1.15	.65
V	1.09	.66
W	1.07	.68
X	1.02	.69
Y	1.01	.70

Table XXI
Unrotated Factor Matrix and Communalities: Specialist Sample
(N=207)

Variables	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	h^2
1	30	33	16	-37	-11	13	02	-14	24	13	27	-06	-16	-14	06	11	10	-04	06	08	-01	15	12	05	-22	73
2	38	47	00	-12	04	35	-09	-13	08	01	18	07	-02	11	-08	04	-02	-09	04	10	07	-04	01	-07	-05	62
3	-02	60	18	25	-03	13	-14	-03	25	-11	23	-10	-01	14	-00	01	07	-11	09	02	05	-03	02	-02	05	68
4	04	40	13	-27	-05	21	09	-20	36	-06	36	-02	-12	-28	12	13	14	05	-06	02	-09	-13	04	-05	02	78
5	53	49	-18	-10	15	18	02	-10	-05	-00	-05	-03	-09	03	01	02	-01	06	07	02	00	-09	10	-07	-08	69
6	-12	06	38	12	-19	34	28	-09	-10	17	-13	05	-08	13	16	-19	17	13	-11	-00	08	-20	-05	-17	11	71
7	07	-20	30	08	-31	41	34	-12	-06	13	-06	06	04	24	07	-21	20	-07	-01	04	15	05	-01	02	-10	75
8	05	-11	25	-24	-53	20	-14	-20	-06	-11	12	03	04	10	-07	-22	12	05	09	-07	23	03	06	-01	-09	71
9	-57	59	28	14	04	05	00	-07	10	-08	09	-07	04	04	05	-04	04	-09	-03	02	-03	-05	-01	-03	06	83
10	-07	-18	18	-05	-15	03	15	20	00	-03	05	42	-14	21	07	10	00	17	29	34	-01	00	07	-07	-05	65
11	-44	52	39	15	01	-02	-01	04	-36	25	-11	01	-05	-12	02	02	-06	05	-01	02	08	05	03	07	-08	89
12	20	-30	35	13	19	17	-13	-12	-02	-26	-04	-09	-07	-16	22	-18	-17	01	18	04	-13	28	-04	05	18	74
13	-08	-29	35	-14	-55	09	-18	07	-16	08	03	-07	-01	-09	07	04	-08	-05	-09	-02	02	-08	-04	20	08	71
14	33	04	02	-39	-42	20	-08	-04	-30	12	01	-01	10	10	02	-01	-05	-08	03	-05	08	-20	09	04	01	68
15	33	-22	29	05	-20	02	-01	-09	-05	-22	-17	-05	-06	-16	27	-16	09	00	15	-06	-16	27	03	-12	11	66
16	-57	53	31	08	01	-08	-11	-05	13	-13	05	-09	13	21	-02	-04	-03	-03	-01	06	-12	04	01	-01	-07	86
17	-27	47	34	-05	-00	-11	02	-03	03	-02	11	24	-04	-22	11	04	-13	18	-18	-26	-05	-08	-09	-03	16	75
18	27	37	10	-36	-04	-15	-11	06	17	-07	02	21	-19	-06	-06	-05	00	09	09	-10	-01	15	-21	-06	09	62
19	44	39	17	-27	08	-02	-09	23	-03	-03	-15	00	-06	14	-02	20	05	05	01	20	08	-04	-04	01	-04	65
20	27	20	03	-21	-14	-36	-24	-16	14	10	-35	-17	05	05	10	11	-02	14	09	09	-05	05	-05	15	-17	69
21	07	-12	22	10	-06	-16	-22	-09	01	-11	-11	-15	-39	-07	22	10	-11	02	08	12	06	-25	01	-05	-01	52
22	05	13	10	-25	-09	-19	-26	03	02	14	-06	26	-20	10	-29	02	23	09	-09	-30	-08	14	22	-01	12	68
23	-07	-18	30	-16	-13	01	-14	11	20	-01	-13	-15	31	04	09	05	04	40	-06	-06	01	-19	-06	30	09	70
24	40	46	-19	-22	-05	11	-04	09	-13	-04	-01	05	-09	-08	02	04	06	08	-10	14	-01	13	-23	07	-01	64
25	-14	-04	13	-08	-14	-13	21	00	11	-02	18	16	22	07	-09	11	18	22	-12	08	36	28	-13	03	10	61
26	25	03	25	-31	-32	-29	23	-01	00	14	01	-28	17	-14	-04	-08	04	02	-07	04	-18	-16	-02	-05	-06	68
27	17	-00	26	-20	-24	-29	26	-05	-02	05	12	-17	-01	-13	-30	-29	-03	12	06	07	-05	04	-06	-23	-06	68
28	22	02	14	-18	-15	-25	32	-11	07	31	-17	-04	-04	-01	-08	-02	08	-19	-12	-06	-23	10	11	-01	-03	58
29	-11	-43	32	-10	-11	-04	-07	28	07	-03	04	-09	-19	-15	-04	03	-14	-06	-04	-05	07	-19	-04	-23	-15	64
30	-33	46	41	13	05	-11	-06	08	-33	26	-12	18	-13	-04	-07	-02	-02	11	10	04	06	09	09	02	-04	82
31	-04	-03	15	-03	-05	08	-13	-05	-11	13	20	-29	-11	-09	07	31	-11	-09	-30	09	-01	35	-04	-19	-14	63
32	29	-28	33	07	07	-17	-17	-11	-07	18	27	-06	13	-10	-03	05	-03	-23	01	-04	18	-17	-23	03	-01	66
33	43	-06	22	23	04	-25	-10	-15	-13	04	14	01	00	02	-29	-02	16	-04	-04	-02	05	-13	-26	06	-00	63
34	43	02	18	19	-06	-11	13	-09	-01	-11	-00	19	-10	06	19	21	-14	-07	18	-06	17	01	-25	15	01	60
35	26	31	00	-25	-08	-09	20	-05	-08	-12	14	23	02	19	-12	05	-02	-02	-18	11	07	-01	09	17	16	54
36	12	18	-05	-27	-16	-22	13	16	-14	-29	15	14	03	-13	11	-01	-33	01	09	-32	19	14	04	-06	08	70
37	15	22	18	-08	07	-34	01	05	05	32	05	12	22	01	18	01	-18	-28	32	-01	14	-10	-14	-14	06	72
38	08	-15	28	18	03	-28	-32	-28	-08	-15	-00	20	10	17	-20	08	-09	-03	-20	06	-16	10	12	-13	05	68
39	41	15	28	-13	19	05	10	33	28	11	-12	04	16	-04	-00	-14	-04	15	10	-00	-08	08	-02	-03	-14	66
40	22	06	22	-23	20	-11	04	35	20	21	04	07	26	05	23	-02	16	-09	-07	-17	-11	06	-06	-08	01	63
41	26	03	23	-02	03	06	-03	-28	11	10	-07	-18	-03	29	14	29	-14	30	-02	08	11	09	06	-06	23	65
42	29	20	-02	06	24	-12	13	-00	-00	08	-01	-17	-13	-01	-26	-38	-14	32	02	24	03	-02	-12	-15	24	76
43	48	-18	34	25	21	-03	-18	02	00	09	15	06	10	-13	-06	08	07	02	-01	07	08	-01	13	-08	-09	64
44	40	-19	32	12	26	-03	-04	-13	-02	06	06	20	20	-04	18	-10	15	-03	10	02	-01	11	10	06	-07	60
45	-29	40	32	06	08	04	05	04	28	-23	01	-08	-03	30	-02	-22	-01	-15	-15	-05	-13	-02	-08	15	05	74
46	47	01	27	08	42	-11	-07	03	-01	-00	-06	13	17	10	18	-16	-02	12	-11	-07	02	-13	03	-00	02	65
47	39	-35	37	24	-02	-02	16	-08	-09	03	-01	-26	08	09	-08	07	01	-03	-04	05	-10	10	-07	06	00	64
48	16	-18	34	-04	-10	30	-26	-12	07	17	-04	-11	11	00	-24	04	-15	03	04	-19	09	15	09	11	20	62
49	25	-23	29	22	07	-03	10	-10	06	-17	-00	14	-04	09	02	13	-22	16	-43	04	03	-03	-17	-02	-26	72
50	60	42	-07	-02	19	12	11	07	-29	-20	-04	-13	09	03	03	05	-04	05	-02	-05	-02	01	00	00	-11	78
51	25	04	19	-00	11	10	10	14	00	01	39	-13	13	-17	-17	-07	-29	06	05	15	-01	-11	37	23	05	73
52	51	40	-06	02	14	19	11	04	-28	-13	10	-07	11	05	-03	00	-15	02	12	-03	-09	-01	13	01	01	69
53	02	-23	36	07	-24	-12	13	-01	19	-11	-00	17	12	23	-09	19	-25	03	16	-12	-14	-15	18	-22	-05	69
54	35	31	09	07	-11	05	04	-45	-02	-11	04	07	-01	00	02	09	12	-05	09	-19	-19	-15	-05	-08	-03	60
55	-04	-20	15	-02	-22	-25	05	09	-00	15	17	16	-14	05	04	15	-01	-05	08	38	-37	-02	-09	16	25	69
56	-46	53	28	08	04	-11	-05	02	-10	-02	-04	-09	14	21	-03	-01	-11	-13	09	10	-07	08	-00	-03	-13	76
57	-50	53	36	15	05	06	09	-08	-02	05	05	02	-08	-24	10	05	09	07	-08	-07	00	-14	00	-02	15	85
58	-10	-02	-11	-08	-33	-34	37	-04	-25	-24	16	-08	08	02	04	03	02	-00	-07	-02	-04	06	-10	05	04	57
59	-45	46	42	17	-02	-03	04	05	-37	20	-12	00	-02	-15	03	-00	-07	03	-00	02	07	07	05	08	-07	87
60	18	12	15	-19	-01	-14	23	13	22	04	-15	-03	-31	16	15	-16	-15	-32	-16	-04	07	02	16	37	-09	76
61	19	03	26	02	12	-10	-20	30	-12	-29	13	-08	19	-04	02	-03	34	-23	-04	21	15	03	00	01	30	75
62	36	-11	20	10	08	-19	-06	19	-20	-07	05	03	02	-11	26	02	18	01	-24	01	-06	02	32	-08	-01	60
63	27	07	14	-19	10	-25	-21	02	05	-22	-19	-19	-12	04	16	-18	06	11	-10	-01	17	-10	09	-07	-09	53
64	15	-04	20	-09	01	-33	-22	-05	08	-05	-08	-04	-41	08	-15	-12	11	-19	02	07	28	-03	12	-06	07	61
65	-08	-26	41	08	08	14	07	27	-05	-04	09	-12	-22	18	-14	21	24	08	30	-24	-13	02	-10	05	-06	77
66	-17	-08	34	03	01	-02	06	-07	10	-27	-21	01	13	-34	-04	16	28	04	16	16	-01	-07	09	05	-10	61
67	15	-06	26	06	27	03	02	36	-22	-04	22	-33	-26	26	-08	11	11	09	09	-27	-09	-00	-09	06	-05	79
68	49	25	-13	25	08	-20	13	-39	-17	06	-09	-06	03	08	03	02	11	-07	07	-12	-04	01	05	00	02	70
69	35	35	-17	50	-50	06	-10	32	18	04	00	00	-01	-03	-04	03	03	02	-07	-02	01	-01	04	-04	-01	94
70	25	24	-16	60	-51	02	-11	31	23	06	01	00	01	-05	-04	02	01	01	-07	-02	01	-00	04	-03	-00	95
71	53	42	-21	47	-37	-07	02	08	07	03	-05	-02	-01	-04	-05	00	-00	02	02	01	-01	01	-04	01	01	89
72	44	35	-19	51	-39	-08	-03	15	09	-02	-11	03	03	-06	-01	-07	-01	-01	-01	-05	02	03	-01	04	-03	83
73	30	-16	08	-21	-16	32	-03	22	-27	00	-10	18	-05	17	07	07	-01	-10	-23	07	-16	-14	-01	-23	10	68
74	-37	11	20	-18	-24	09	-49	04	-03	-18	-01	03	25	13	-04	-20	-13	-08	03	06	-09	04	-06	-11	-20	77
75	18	37	-27	-33	-09	13	-44	03	-23	07	-02	03	05	-02	06	-07	06	-03	-03	07	-22	-05	-23	03	-02	76
76	11	-22	25	15	13	11	03	02	-08	-14	29	19	-23	-02	07	-37	-08	05	-06	02	-17	04	-10	14	-21	63
77	-31	28	-10	-15	-23	-29	29	11	-20	-39	-06	-17	09	06	-03	16	13	02	06	02	05	-07	09	-06	-03	75
78	05	12	25	-12	10	30	20	14	17	02	-17	-27	06	07	04	08	-13	-17	-06	03	08	16	-07	-20	22	57
79	14	02	34	-03	14	25	28	04	13	-16	-37	19	02	-24	-26	07	-04	-27	-06	07	07	01	-00	-02	11	75
80	22	07	35	-12	08	27	-02	01	-04	-24	-35	10	03	-25	-38	13	-06	-07	00	-06	-10	-06	-07	14	-00	74

Note: Decimals have been omitted.

Table XXII
Rotated Factor Matrix and Communalities: Specialist Sample
(N=207)

Variables	Factors																									h^2
1	41	-02	-01	-01	-04	18	-03	-05	51	28	-01	04	-08	-00	-07	-01	07	-18	09	-01	21	19	15	05	17	73
2	60	-06	09	11	-17	21	07	-15	25	-07	-08	-02	01	-06	-03	-18	-09	00	03	-03	01	05	13	06	-01	62
3	19	20	08	32	-01	08	-02	-10	32	-15	-11	-05	-05	08	03	-55	-03	01	12	02	04	-01	10	01	-01	68
4	21	02	-07	-02	-02	-02	04	02	83	08	-02	00	-01	-06	01	-14	-03	-02	03	-02	03	07	09	01	-00	78
5	70	-04	-06	15	01	12	02	-19	15	04	-14	-16	-08	-03	02	06	-08	05	00	00	-11	-13	08	-02	01	69
6	-10	31	-06	02	-67	04	06	03	14	04	-14	02	04	06	11	-02	04	16	-10	11	-06	-10	-15	-06	00	71
7	-07	00	03	03	-74	06	08	-05	-04	09	-05	03	14	08	12	02	18	-07	-06	17	19	-05	-02	02	15	75
8	04	-10	07	-01	-58	-05	-06	18	05	08	11	-04	-17	-05	-22	-08	25	-16	06	-10	23	02	11	18	-12	71
9	-09	56	-10	-00	-00	-08	02	-03	28	-11	-02	-06	05	-02	07	-61	-10	03	10	03	-01	-00	-03	05	-02	83
10	-05	02	-18	-05	-20	05	02	-07	-06	-04	-01	66	-09	11	03	06	03	-08	-09	-08	22	-15	05	-01	-08	65
11	03	92	-02	-01	-04	-01	02	01	-03	00	03	-03	00	02	01	-13	-06	-02	04	02	01	08	00	04	01	89
12	-09	-09	07	02	-11	07	10	11	-03	-05	-04	08	-08	02	07	-00	80	04	-05	-05	-07	09	09	-01	-01	74
13	-21	08	15	03	-36	-11	02	47	-03	07	10	17	-10	00	-10	10	21	-19	05	-07	-11	28	09	10	06	71
14	39	-10	10	00	-47	-08	-06	22	-06	17	00	02	-05	-10	-10	16	-01	-20	15	-16	-16	06	14	07	-00	68
15	-01	-10	01	07	-13	-01	10	-02	01	15	-06	01	-12	05	-02	10	71	-02	-01	-04	-04	-01	-11	-21	-03	66
16	-06	48	-13	-04	09	-10	-05	05	09	00	-02	00	01	-01	-02	-75	-08	-05	00	04	06	10	-02	06	-05	86
17	-03	54	00	-02	07	-07	04	15	42	-03	-01	-02	09	-07	-17	-16	-03	10	-18	-34	-07	-04	-08	-06	-01	75
18	38	00	02	04	14	09	08	05	24	13	07	11	-12	01	-30	-08	08	18	05	-36	14	-04	-19	03	08	62
19	62	05	01	07	04	06	20	11	-01	09	-13	16	-25	11	-05	-04	-14	03	04	-07	07	05	-04	-20	08	65
20	30	01	04	09	27	08	-08	30	-10	37	-20	-01	-31	-17	-07	-03	08	-16	02	07	08	-05	-20	07	09	69
21	-09	06	11	03	05	01	-02	06	08	-04	-11	12	-59	05	11	07	17	-04	-11	02	-21	04	04	04	01	52
22	05	08	-05	00	02	08	-02	03	04	10	01	02	-07	08	-78	03	-08	-03	08	-06	03	-04	-09	-06	04	68
23	-14	-03	-02	-07	-05	04	03	77	02	07	-15	-01	-02	07	01	-05	03	-03	-05	04	10	-12	04	-10	-04	70
24	69	00	-04	18	06	-05	04	05	12	-02	12	03	04	-08	-03	10	00	15	04	-04	07	12	-14	00	07	64
25	-12	04	05	-04	-10	-16	00	10	05	02	-05	06	12	-04	-05	-02	-11	01	-08	-07	69	07	-06	-04	-04	61
26	08	-03	12	02	-10	-20	02	24	11	71	00	03	-06	-03	04	03	01	04	03	-04	-05	05	07	-10	03	68
27	-01	00	11	-01	-12	-13	03	-05	04	64	10	03	-12	04	-07	-01	11	32	-03	-13	15	02	14	08	-10	68
28	-00	-00	05	02	-04	-03	09	-12	03	60	-11	04	09	-06	-18	11	-00	-04	02	07	-05	03	-08	-07	32	58
29	-40	-08	02	-09	-13	09	17	12	-00	14	19	11	-34	24	07	09	-03	-03	-13	-22	-08	25	06	-03	-09	64
30	05	86	-01	-01	-01	09	01	-07	-10	01	02	12	-06	06	-16	-08	-04	02	03	-02	07	-04	01	-00	-02	82
31	01	10	04	-05	04	01	08	07	08	05	-10	-05	-01	06	02	01	07	-10	-10	05	05	74	01	00	-04	63
32	-10	-08	72	-07	-05	14	00	08	-00	09	02	-01	-10	06	09	09	02	-05	-03	-09	-01	13	09	-14	-02	66
33	11	-06	66	15	01	-02	05	-03	-05	12	03	-02	-09	13	-15	05	01	15	-16	12	04	-08	00	-07	-07	63
34	20	-02	38	19	01	-04	10	-06	02	-09	-21	15	-08	09	15	12	21	-11	-19	-24	10	-15	-10	01	20	60
35	39	-04	07	-00	-10	-29	06	-02	08	01	-09	16	07	-16	-23	-07	-15	08	-07	-12	11	-07	16	-07	23	54
36	16	02	-08	02	08	-31	-03	-02	03	02	05	-09	-02	-05	-08	08	11	-04	-00	-71	08	-01	11	-02	07	70
37	08	17	37	00	09	20	-07	-09	-04	26	-13	16	-04	-13	19	-10	-11	-07	25	-43	-00	-12	-08	-16	07	72
38	-11	-01	29	-04	11	-02	04	-08	-20	-00	-16	10	-09	-17	-41	-22	15	-07	-34	08	-06	08	06	-15	-20	68
39	26	-04	-09	10	06	42	22	13	01	32	00	03	04	16	07	-04	04	13	-06	-16	16	-12	07	-30	09	66
40	07	-07	03	-06	04	25	00	14	08	25	01	03	18	14	-01	-08	-10	-03	09	-23	05	01	-16	-53	15	63
41	17	-03	05	-04	-07	11	-08	14	06	-00	-71	05	-12	02	-03	-00	12	08	-12	04	05	10	02	-01	-00	65
42	23	02	04	06	08	09	-02	-09	-06	17	-09	-03	-10	-01	03	02	01	76	-04	03	00	-13	13	02	-05	76
43	04	-05	39	12	03	30	11	-07	01	03	-07	01	-13	10	-04	15	11	-03	-16	09	09	05	26	-39	-15	64
44	08	-04	32	-10	-03	29	02	-09	-01	05	-05	03	05	-01	01	10	31	12	-12	07	14	-19	10	-43	01	60
45	-05	19	-04	-02	-01	-06	07	04	14	-02	00	-07	01	06	-05	-72	-01	12	-10	04	-03	-10	-05	00	30	74
46	22	-03	23	-06	03	26	01	06	-08	00	-13	-10	-06	02	02	00	06	13	-28	-08	-05	-25	04	-52	06	65
47	-06	-14	36	06	-11	-01	14	02	-18	24	-24	01	04	25	11	09	29	04	-19	21	01	12	13	-14	05	64
48	-05	-04	19	-01	-18	32	19	27	-06	-01	-25	-14	08	07	-27	01	23	-03	10	-04	-01	17	25	12	-03	62
49	-04	-10	19	05	-05	02	16	05	-03	-02	-11	02	-07	02	08	04	03	02	-75	01	10	13	-01	-11	06	72
50	73	-01	03	15	04	-11	10	-11	-06	04	-07	-23	04	13	12	06	04	05	-11	-06	-07	-05	11	-21	00	78
51	11	-00	09	02	05	07	04	07	10	08	01	05	06	05	08	02	01	11	-02	-04	-03	01	79	-11	07	73
52	64	01	03	15	00	-06	04	-16	-04	01	-10	-11	14	10	09	01	08	05	-02	-10	-15	-10	31	-12	-04	69
53	-29	-11	01	07	-13	00	14	-01	-06	25	-28	28	-05	12	-08	-16	03	-25	-27	-27	-05	-14	16	01	-16	69
54	34	-00	25	14	-09	-08	04	-17	32	15	-17	-11	03	-03	-10	-09	16	-17	-14	03	-18	-22	-10	07	-11	60
55	-15	-00	15	-00	09	-13	-09	10	04	13	-01	72	07	-00	-06	04	10	05	03	11	-12	07	00	-01	11	69
56	05	56	-07	-04	08	-06	-02	-07	-13	06	-02	03	02	00	07	-60	-09	-09	06	-02	03	05	-01	06	-03	76
57	-13	72	-06	-01	-03	-10	09	02	44	-10	-04	-07	04	-01	03	-24	-07	08	04	02	-08	-03	-05	-01	-04	85
58	-05	-02	03	01	-01	-67	-14	-00	-03	20	06	06	11	-03	06	02	05	-00	-04	-12	11	01	-04	06	04	57
59	-03	91	-03	-00	-05	-05	05	01	-06	02	04	-02	03	01	04	-12	01	-03	03	00	02	08	03	02	02	87
60	08	-02	-07	02	-04	02	07	-01	00	15	02	02	-20	01	-01	-08	-01	-05	-05	-08	-03	-03	07	-05	80	76
61	09	-05	27	03	-00	-19	18	08	-05	-19	11	07	-15	08	-03	-19	11	12	30	04	09	10	09	-56	-05	75
62	05	01	04	10	01	-08	-06	-04	-02	05	01	00	-16	04	-10	21	15	-08	-15	04	-06	07	12	-65	02	60
63	19	-08	-04	-05	04	00	-04	14	-03	10	-02	-22	-54	-02	-05	-06	07	09	-07	-05	02	-07	-06	-25	07	53
64	-05	-04	20	-02	-01	02	04	-15	-04	03	-01	02	-61	01	-30	-04	01	12	11	-01	05	02	-00	-04	20	61
65	-17	04	07	-10	-09	06	13	05	00	-02	-02	15	00	80	-06	-01	10	-11	01	06	05	-02	-02	01	-06	77
66	-18	16	-03	-10	09	-11	43	11	17	08	04	04	-17	-00	10	-02	18	-21	04	23	18	-16	02	-12	-21	61
67	11	03	11	-06	03	-02	-09	02	-07	-03	-01	-06	-05	82	-02	-02	-01	10	-05	-01	-08	10	08	-14	07	79
68	34	-00	31	21	08	-11	-12	-32	-03	16	-29	-24	03	-07	-03	11	11	-02	-05	14	-10	-25	-07	-07	07	70
69	13	-02	-04	95	-05	02	-03	02	04	-01	03	02	00	-00	-02	-02	-04	-01	02	-02	-01	05	03	-03	-02	94
70	-04	-02	-02	96	-03	04	-04	03	01	-03	03	03	02	-01	-00	-03	-01	-01	00	01	-01	05	03	-02	-03	95
71	33	-02	11	84	05	-05	-04	-10	01	09	-07	-03	01	-07	02	05	06	07	-01	01	-02	-09	-00	02	03	89
72	20	00	07	86	03	-03	-01	-05	-06	03	01	-07	-00	-09	01	02	09	01	-04	-02	-00	-11	-02	-02	05	83
73	25	-18	-08	-02	-44	01	16	05	-13	-02	03	25	03	04	-10	16	-03	-03	-11	-08	-33	22	-09	-23	-05	68
74	-01	12	-10	-10	-13	10	-04	24	-18	-00	29	03	-09	-15	-11	-54	09	-21	03	-13	-01	16	-02	11	-29	77
75	61	-00	01	02	04	07	-16	21	00	-02	29	02	04	-18	-13	-05	-04	-03	19	00	-24	12	-22	06	-13	76
76	-04	-02	12	-10	-12	15	-09	-09	05	-09	38	12	02	18	04	-02	32	14	-42	03	-01	-06	15	-06	12	63
77	04	16	-27	-00	06	-69	03	-01	-04	13	00	-01	-10	05	07	-18	-16	-11	14	-09	12	-08	-03	03	-10	75
78	06	-00	-13	-05	-15	12	34	-01	02	06	-32	-08	08	11	20	-19	03	18	17	-13	-03	29	-04	-11	14	57
79	03	04	04	-04	-10	10	82	-11	03	05	00	00	03	-04	07	00	03	04	-08	-03	04	-02	-02	-05	13	75
80	24	07	08	-06	01	07	74	16	-01	02	04	-06	00	08	-15	02	24	-04	-10	02	-10	-05	09	07	-03	74

Note: Decimals have been omitted.

This leaves eleven of the twenty-five factors still unaccounted for. In the following material an analytical and descriptive interpretation of each of these factors is given. Where similarities appeared between the 1963 criterion study and the present investigation, they will be noted and emphasized.[20]

Factor A has high loadings on variables which suggest a factor title of Professional and Clinical Excellence: quality of hospitals in which physician works and maintains courtesy privileges, ratings for clinical excellence by department heads of the College of Medicine of the University of Utah, senior authorship on a number of publications, number and quality of self-reported contributions to medicine, number of peer nominations as both a preferred consultant and outstanding contributor to medicine, number of formal medical consultations called into by peers, quality of scientific and professional awards received, self-rating of success in medicine, quality of hospital responsibilities, and number and quality of scientific and professional societies in which membership is held. As expected in view of the generally high profile of the physician typified by this factor, it is not surprising to find that the variable measuring professional seniority or years of professional experience also loaded highly on this factor. In general, Factor A creates the impression of a physician who has achieved a high level of competence and professional recognition.

The high loadings on Factor B convey the impression of a specialist with considerable administrative responsibilities in that the high scorer on this factor has an above average number of M.D. assistants, nurses, clerical, administrative, and janitorial workers on his ancillary staff. An appropriate title, therefore, seems to be Medical Administrative Responsibilities. In addition, the physician characterized by this factor has attained a considerable level of professional and scientific recognition: he has an above average number of listings in honorary compendiums, such as Who's Who in Medicine, is frequently requested to serve on scientific and professional advisory boards as well as to serve as an editor of scientific and professional journals, and he stands high in the rankings of the faculty of the College of Medicine of the University of Utah.

As in the 1963 study, the present investigation's sample included physicians engaged in full-time hospital work. However, in the 1963 study no single factor emerged which could be clearly interpreted as reflecting this type of physician performance. Instead, three factors (Factors H, I, and J) appeared which seemed to indirectly reflect this kind of practice. In the present study this area of performance clearly appeared in Factor F and was named accordingly: Hospital Practice. If reflected, the major positive loadings are on the variables measuring whether or not a physician is in a hospital practice and the number of technicians on his ancillary staff. As expected with a hospital practice, negative loadings were obtained on the variables measuring the amount of time spent with patients and the number of hospitalized patients for which the physician has primary responsibility.

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[20] Coefficients of congruency were not computed in the present study between its factors and those in the 1963 Specialist study. This was due to a computer error in the factor analysis which was not discovered until the final phases of the study when funds and time were very limited.

Although Factor L had only two major loadings it is still difficult to succinctly label. These loadings were on the variables measuring the average number of professional positions held per year since the physician started his practice of medicine and a self-estimate of the value of a physician's office equipment. In view of a slightly similar factor in the 1963 Urban General Practitioner study, the present factor is tentatively given the same title, namely, Professional Mobility.

Factor P (reflected) appears to involve Contributions as an Editor since the most outstanding characteristic of the high scorer is that he has been invited a greater than average number of times to serve as an editor for scientific and professional journals. Significantly, this type of physician also tends to be nominated by general practitioners as an outstanding contributor to medicine and to hold a high clinical faculty rank in the College of Medicine of the University of Utah. Other high loadings indicate the physician characterized by this factor tends to make numerous house calls, has several M.D. assistants on his ancillary staff, and took a longer than average time to get his National Board Specialty Certification after receiving the M.D. degree.

The most striking thing about Factor Q is that the composite measure of professional satisfaction, which loads highly on this factor, is factorially simple. It appears only on this factor, and, therefore, is essentially independent of the other numerous aspects of specialty performance that are analyzed in this chapter. The obvious inference is that the degree of occupational satisfaction is independent of level of performance within the profession. The only other clue to this finding is that the factor loads positively on the measure of gross income. In other words, if a physician has a high income he tends to be satisfied with his role in medicine. A suggested title for this factor, then, might be Overall Occupational Satisfaction (somewhat similar factors were found in the 1963 studies of Rural General Practitioners and of the Full-time Faculty of a college of medicine).

Like Factor L above, Factor R had only two major loadings which bear no obvious interrelationship: the proportion of office patients that fail to pay their medical bills and the number of subscriptions to scientific and professional journals. In view of this the factor is given the title of its highest loading variable: Proportion of Patients that Fail to Pay Medical Bills.

The high loadings on Factor S (reflected) portray a physician specialist who sends his patients to several rather than one or two hospitals, has an individual rather than a group, clinic, or hospital practice, has an above average patient load, and gives few speeches to laymen groups on medical topics. Since this clustering of loadings is not obvious to interpret or label it is also given the title of its major variable loading, namely, Number of Hospitals Utilized.

The only major loading on Factor U is on the variable measuring the number of research projects a physician has been actively involved with during his medical career, thus the title Involvement in Research. Significantly, this factor does not load on those variables dealing with quality of or recognition for research work. Such a physician, then, appears orientated toward research but has not been outstandingly successful in his endeavors.

Although Factor W has only two major loading variables its meaning is quite obvious: Hospital Courtesy Privileges. Both of these variables deal with the hospitals in which the physician portrayed maintains courtesy privileges. With one, the high scoring physician maintains privileges in an above average number of hospitals. With the other, the physician tends to maintain these privileges in hospitals that are judged to uphold superior standards of medical care. Thus, the physician characterized by Factor W has courtesy privileges in several hospitals that are known for upholding high levels of care and treatment.

The final factor to be described in this section is Factor Y, Number of Speeches to Laymen Groups. As reflected in its title, the most significant loading is on the performance variable measuring the average number of speeches given annually to laymen groups on medical subjects. Two other secondary loadings were obtained on the measures of the average number of journal articles read and the average number of house calls made in a given period of time.

In summary, the preceding factor analysis of the eighty criterion measures of the specialist sample resulted in twenty-five factors, fourteen of which were found to be at least somewhat congruent with those of the Specialist study of 1963. The remaining eleven factors generally appeared quite different from those of the 1963 study. Eight of these eleven factors were factorially simple in that they had no more than three variables on each with loadings over .30. The other six were quite complex and probably measure significant aspects of physician performance in specialty practice. It should be emphasized, however, that these concluding remarks are based on a subjective analysis, description, and interpretation of the findings. No objective tests of the congruency of these factors with those of the 1963 study was attempted as in the Full-time Faculty and General Practitioners studies of the last two chapters. This was due to a computer error which was discovered after the funds for a complete analysis had been exhausted. In view of this, no further analyses were attempted for this sample.[21]

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[21] The Biographical Inventory was validated against the first set of criterion factors for the specialists. Unfortunately, some computational errors had occurred in this first set of factors so we cannot report any specific findings with much confidence. However, the general type of finding for the Biographical Inventory scores against factors for specialists were very similar to those found for the other physician groups studied in this project. In other words the Biographical Inventory showed high initial validity for each of the several factors and also showed a fraction of the Biographical Inventory scores to have significant cross validities while other Biographical Inventory scores did not show significant cross validities. We therefore suspect that this general finding would have been obtained on the second (computationally corrected) set of factors.

Chapter VIII

Discussion

For the person seeking to find a single, all-inclusive predictor of physician performance the present research is probably quite discouraging, both on the criterion and on the predictor sides. All of the predictors, the BIM, the MCAT, and the GPA, were consistently found to only predict a portion of the criteria. In none of the studies could a convincing case be built for recommending the use of only one predictor at the exclusion of the others. On the other hand, if one is willing to subscribe to the use of multiple predictors or a battery of predictors the present research is at least moderately encouraging. In each study it was found that a substantial number of the criteria could be predicted or accounted for to some significant degree by using all of the predictors studied. Each predictor seems to make a small contribution and collectively they make the prediction of multiple criteria of physician performance a feasible undertaking (though the occurrence of some negative correlations can be troublesome where the negative relation is not easily explained). In this sense, the present studies are viewed as a significant step forward in improving medical school selection and prediction. Moreover, if some of the problems inherent in the present predictors and criteria could be resolved, the predictive picture might be even more encouraging. In the remainder of this chapter, consideration is given to some of these problems and how they might have affected the present results.[22]

As for the criteria, it will be recalled that in each of the three studies of on-the-job performance factor scores based on a factor analysis of 80 criterion measures were used. In the Full-time Faculty study 25 factor scores were utilized, in the Specialist study 25 factor scores, and in the General Practitioner study 30 factor scores. It will also be recalled that the factors from which the factor scores were derived were compared to the factors obtained with similar groups in the previous 1963 criterion study. In only the Full-time Faculty study were the factors found to be highly congruent with those of their companion 1963 study.

However, even with the Full-time Faculty study the high degree of congruency found should not be accepted without some hesitency. This study was based on a sample of only 61 academicians and researchers. Of these, 48 were participants in the 1963 study and only 13 were new doctors drawn from a different non-Utah population. Thus, with the addition of only 13 new members to the sample, the factor analysis could be said to be essentially a factor analysis of the same data as that of the 1963 study. In essence, then, a first glance at the congruency data would suggest the criteria measures were quite reliable, but a more careful look implies that the reliability is largely an artifact of the sampling procedure.

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[22] We are keenly aware of questions about restriction of range and homogeneity of the samples studied. We feel, however, that even though students may be relatively homogeneous in work, physicians on the job have considerable heterogeneity, even across a large number of dimensions of physician performance. A lengthy note in Performance Measures of Physicians (Price, Taylor, Richards, & Jacobsen, 1963) deals with many points on this problem, most of which argue that validities would not have been radically different in a more heterogeneous sample.

With the Specialist study, on the other hand, a new problem presents itself. A relatively large number of non-Utah physicians were added to the already large 1963 sample (28 per cent of the sample of 207 certified specialists were practicing outside of the state of Utah). Normally, this would provide an adequate basis for giving some idea of the reliability of the criterion factors. However, at least one problem arose, confounding the results, which showed the factors of the 1963 study and the present study were not highly congruent. For one thing although the sample was homogeneous in the sense that all participating physicians were certified in one of the medical specialties; it was also quite heterogeneous in terms of the variety of specialty practices represented. Since each specialty could be characterized by the type of practice involved, and since at least some of these types of practice are quite unique,[23] the total sample could be viewed as a composite of several different sub-samples. As a consequence, when the same criteria were collected on all specialists, regardless of their area of specialization, considerable error could have been introduced into the data, thereby reducing its reliability and the computed coefficients of congruency between the 1963 and present studies. An acceptable alternative to the present procedure would have been to treat each specialty as a unique population and to conduct a series of small sample criterion studies from which specific criteria could have been developed for each specialty and against which the predictors could be validated. This, of course, would have been very expensive in terms of time and money and was prohibitive for the present study. In any event, this problem alone could have at least partially negated any positive relationships which might exist between the predictors employed and the measures of on-the-job performance in specialty practice.

Another consideration which entered into the criteria of the General Practitioner study is what to do with physicians who are neither full-time specialists nor full-time general practitioners. A relatively large number of doctors have practices in which they devote some of their time to a specialty and some of it to general practice. Thus, they are in effect both specialists (without board certification) and general practitioners. Further, in the 1963 study, these physicians were treated as general practitioners and were included in the general practitioner sample and study. In the present study, however, a sufficient number of this type of doctor cooperated (N=104) to compare them with full-time specialists and full-time general practitioners. In these comparisons t-tests were computed on the 80 criterion variables between these part-time specialists and both the full-time specialists and the full-time general practitioners. In both cases, over 50% of the t-tests were significant at the .01 level of confidence. Such results strongly suggest that part-time specialty practice represents a unique type of medical practice. As a consequence, in the present study this group of physicians was not included in the factor analysis of the criterion variables of the General Practitioner sample. Thus, this factor alone could have had a major influence on the general lack of congruency between the criterion factors of the present and the 1963 General Practitioner studies. It is also emphasized that in view of the uniqueness of this sample of part-time specialists, the present criterion study, in which they were not included, probably represents a refinement over the 1963 effort.

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[23] Compare, for example, the radiologist, the psychiatrist, and the surgeon. Many obvious differences exist in their practice.

Still another problem deserves consideration when one views the method employed in determining the congruency of the criteria factors. In both the 1963 studies and the present studies the criterion variables were intercorrelated and factor analyzed by the principal components method whereby 1.00 was placed in the diagonal cells of the correlation matrix and all factors having a corresponding eigenvalue greater than 1.00 were extracted. These factors were then rotated to a final solution using the varimax analytic orthogonal rotational solution (Kaiser, 1961). Note that the same procedure was utilized throughout in rotating the factors thus obtained to a final solution. However, if the present studies had modified their rotational procedures so their final solutions would maximize the congruency between their factors and those of the comparable 1963 studies, another more congruent and encouraging picture probably would have emerged. To do this, however, would have involved considerable expenditures in both time and money to develop a computer program which would maximize factorial congruency. Overall, then, the congruency data presented throughout this report should be viewed as a minimal estimate of the congruency or reliability of the criterion dimensions.

Still another problem related to the criteria of the present study is that of the comprehensiveness of the criterion measures. In other words, to what extent do the criteria dimensions measure all pertinent aspects of physician performance in each of the types of practice studied? It is well known that the reliability of criterion measures is generally related to the comprehensiveness of such measures. If in certain criteria one is only measuring the periphery (or veneer), rather than the heart of a criterion domain, considerable error could be present in the measures. On the other hand, some of the criteria used to date were included because they were readily and sometimes fairly objectively obtained. In responding to this problem, the authors feel that although the on-the-job performance measures are far more comprehensive and meaningful than any utilized by anyone heretofore, they certainly do not encompass the entire domain nor even some of the most central aspects of physician performance (a reason why we have next proposed to return to do further intensive research at the center of the criterion problem).

In fact, a pilot study by the project staff (see Appendix B for a detailed report of this study) has already shed some light on areas of physician performance that apparently play a vital role in actual practice. In the study, all of the participating specialists and general practitioners of the 1963 and present studies were asked the following question: "With regard to your field or specialty, what do you consider to be the basic factors of success in this area?" The responses to this question were recorded verbatim and sorted into sixteen conceptually different categories. Further statistical analyses of these data indicated that the following characteristics or attributes played the most significant roles in the physician's practices:

Ability to establish a warm doctor-patient relationship
Education and training
Honesty and integrity
Willingness to work hard
Availability
Quality of work
Judgment and skill in diagnosis and treatment
Interest and satisfaction derived from medical practice
Keeping abreast
Getting along with, and respect of colleagues
Intelligence
Unselfish dedication to medicine
Drive for self-improvement
Community involvement
Financial success
Attention to detail

Obviously, such findings illuminate untapped and potentially valuable areas for expanding the present criteria of physician performance.

In addition, some obvious and crucial measures of performance were deliberately postponed or otherwise avoided either because they involved very sensitive areas or presented practical difficulties such as insufficient time and funds. Specifically, it is believed that the reliability and comprehensiveness of the criteria would be enhanced if research could be initiated towards the development application, and evaluation of performance measures in at least the following sensitive, but critical, areas: (1) completeness and quality of clinical records, (2) astuteness and accuracy in medical diagnosis, (3) appropriateness and quality of therapy given to patients, including immediate and long range clinical results obtained, (4) skill in communicating with patients and in stimulating confidence and cooperation, (5) ratings and evaluations by hospital house staffs, administrators, paramedical personnel, and peers, and (6) patient evaluations of physicians in terms of quality of and satisfaction with care and treatment received and adequacy of doctor-patient relationships.

However, even this six-pronged program would not exhaust the needs and possibilities of research in the general area of measures of physician performance. It only represents a series of investigations that logically follow from the research already conducted, which at the time of its inception, appeared to be the most comprehensive and logical immediate approach to the problem. It is anticipated that if these six objectives were achieved many additional efforts on the same topics would be warranted and new areas and problems of criterion research would emerge. It appears then, that the criteria of the present and the 1963 studies have opened the area, have shown that it could be researched, have demonstrated the problems and complexity of the measurement of physician performance, and have shown the way for future research; as such, they represent a significant contribution, regardless of the problems and limitations of these measures.

Finally, before concluding this section on the criteria of the present research, brief mention should be made of another area of performance that has been omitted in the present studies. Overall, the research reported could be said to represent an attempt to survey the gamut of the medical profession, extending from medical school selection through and into the years of medical practice. Unfortunately, in this attempt no measures taken during the period of internship and residency training have been included as either criteria or predictors. Undoubtedly this period has an influence on the quality of subsequent performance in actual practice. Preliminary research (Richards, Taylor, & Price, 1962) suggests that performance in internship and residency training is more closely related to on-the-job performance than performance during the medical school years. If so, some important clues might potentially be gathered from internship and residency training periods which could serve as intermediary guideposts in the revision of training and evaluation procedures during medical school, since they would relate effectively to quality of performance in actual practice. In the authors opinion, a comprehensive study of this period is indicated and would be productive.

When we turn to problems encountered with the predictors which might have influenced many of the essentially zero-order correlational relationship between them and the criterion measures, several considerations seem to warrant discussion. First, the manner in which grade-point-averages have been treated in predicting the criterion or factor scores involves an inherent dilemma which probably cannot be resolved. It will be recalled that premedical and medical school grades were collected on all of the participating physicians. Most of these physicians had been in practice for some time. Their GPA's were measures of performances which occurred several years ago in an academic situation which may have been very different from what exists today. Even a cursory review of the literature on research in medical education indicates medical school practices and curricula are dynamic processes that are undergoing continual changes and revisions. It is conceivable that grades of one to four decades ago are not related to on-the-job performance, but that the grades of today are more nearly related to actual medical practice. However, to validate grades today one would have to wait another one to four decades for the medical students to demonstrate their abilities and by then the medical schools would have undergone other changes in their practices and curricula. Because of the two factors of time lag and change, one can never really have an up-to-date assessment of the true predictive effectiveness of the GPA for on-the-job physician performance.

The research to date on the relationship between academic performance and physician performance has generally utilized the composite grade-point-average as the predictor measure. Also, as with most composite measures, several dimensions are usually incorporated into such a combined index. Even though a general trend of significant correlations between GPA's and occupational performance criteria was not found in the present studies, it might still be possible that a few of the GPA dimensions are in fact meaningful predictors of postgraduate on-the-job performance. Moreover, this lack of correlation should not be construed as an indictment of "true scholarship," but as an impetus to define "scholarship" more clearly, as well as to analyze thoroughly the dimensions of conventional medical grades. Toward this end, it is suggested that efforts be made to investigate the following variables and their possible relationships to both overall scholarship and ultimate performance in practice: (1) course content in individual or subgroups of courses (e.g., Do high achievers in basic science courses perform better in actual postgraduate work than high achievers in clinical courses?), (2) types of instructors (e.g., Do faculty members who are actively involved in medical research tend to produce better physicians?), (3) types of instruction (e.g., Do students learn, retain, and perform better in actual practice after receiving didactic teaching, or in an atmosphere where they "learn by doing" and are encouraged to become independent learners?), (4) student testing and evaluation (e.g., Can any new light be thrown on the value of conventional examinations and should evaluations or grades include those qualities of "mind and heart," such as honesty and integrity, motivation and dedication, and personality and character, that are so often found in superior physicians?), and (5) other dimensions particularly relevant to the formal training years of medical students.

Unlike the GPA, which over the years has been shown to be a relatively reliable measure of academic performance, the Medical College Admission Test has not been sufficiently studied to assume it to be a highly reliable instrument. As in the case of the question of its validity, it has generally been assumed to be a reliable test. However, if it is not a highly reliable device, this could certainly effect its validity for on-the-job performance. Therefore, if its reliability could be appreciably increased it is possible that it might also enjoy an increase in validity. In effect, then, it is felt that studies are warranted to determine the MCAT's level of reliability, to determine if it could be increased, and to find out how this increase would effect its validity. We suspect, however, that its low validity results are due much more to the nature of what it is measuring (or neglecting to measure) than in its lack of high enough reliability.

The reliability of the Biographical Inventory for Medicine, on the other hand, presents problems unique to this type of psychometric device. The majority of intellectual tests tend toward the direction of being unidimensional in the sense that they are designed to measure a single trait, ability, or characteristic. As such, a host of statistical techniques are available for assessing their reliability. Biographical inventories, on the other hand, are multidimensional instruments in the sense that they are designed to measure as many different aspects of the examinee's life as possible. From one viewpoint, a biographical inventory should ideally have as many independent dimensions as there are items. As a consequence, the most sound way to determine the reliability of the present BIM is by the test-retest method. This would necessitate readministering the BIM to the participating physicians and then determining how reliable or consistent their responses have been in the two administrations of the test. Obviously, such a procedure is beyond the time and financial resources of the present project. Potentially, however, if the BIM scoring keys are not highly reliable this could have effected their validity in predicting the multiple criteria of the present studies.

From a more philosophical standpoint, it may be noted that the Premedical GPA and the MCAT are typically applied to a quite heterogeneous group of relatively immature persons--college students applying for admission to medical school. Essentially these two selection devices are concerned with assessments of actual scholastic performance--assessments based largely, directly or indirectly, on tests of questionable validity which attempt to measure the student's understanding, quick recall, and communication of recently acquired knowledge. They do not take into account differences in test taking skills or handicaps so common to students, such as inferior preliminary education, ill health, financial straits necessitating a lot of remunerative work, or excessive extracurricular campus activities, which temporarily affect the quality of the students' scholastic performances. Too often ignored is the fact that many of these students, once relieved of these burdens, are capable of catching up with or even surpassing less-handicapped classmates. Nor do these two selection devices take into due consideration the degree of differences in the powerful influence of a student's tremendous rising tide and interest in medicine. That is a transforming experience that comes in a different degree to many students after they enter medical school, or during hospital training, or even later as they begin practice. It is a force that can turn a mediocre student into a studious, hardworking, competent physician; without that driving interest, an excellent scholar in college may turn out to be a below-average practitioner. Furthermore, these selection devices do not attempt to measure other qualities, such as ability to relate well to people, integrity, good judgment, kindliness, etc., which are so important in the successful practice of medicine. They do not attempt to estimate an applicant's potential, as he matures, to perform better academically, or to develop traits of personality and character and dedication. Small wonder, then, that these devices so commonly applied to medical school candidates are generally unrelated to their subsequent on-the-job performance as physicians, and that they have therefore only limited predictive value.

This is not to be taken as an indictment of scholarship but a criticism of an excessive reliance upon grades as conventionally measured in the selection of medical students. In the United States at the present time there are altogether about twice as many qualified applicants to medical schools as there are openings. Generally speaking, most of the total group of candidates who received the highest grades are admitted each year, and those receiving low grades are rejected. Our study, in consequence, has dealt exclusively with those who have tended to receive higher grades. On theoretical grounds, one would not expect the findings and conclusions expressed above to hold equally true if grades were ignored altogether in the selection process. To take an extreme case, it would be absurd to hold that a totally incompetent student could nevertheless become a satisfactory physician, whatever his other qualifications. Some degree of scholarship is essential. It seems likely that conventional grades can and should continue to have an important role in screening out those students who are intellectually incapable of acquiring a medical education or of putting it into practice effectively and safely. But it is selecting from the remainder those to be admitted to medical school, that premedical grades should not be the sole criterion, nor even the most important one. Certainly they should be given less weight than they have in the past.

As far as true scholarship is concerned, it is reasonable to postulate that a moderately high level of intelligence (in the broadest sense of the word), together with considerable ability to study intensively, learn with discrimination, and convert information into working knowledge, are essential for the candidate, the medical student, and the practicing physician. Success in the practice of medicine requires additional qualities, however--*sine qua non* qualities that are not necessarily reflected in sheer scholastic performance. As for scholarship, it is believed that a certain amount of it is essential but that academic excellence above and beyond a high minimum standard, however praiseworthy, has less value per se in predicting outstanding success in the practice of medicine than the possession of those other traits of personality and character, of dedication and human relations that are found so typically in superior physicians.

In view of the immediately foregoing, the limited predictive success of all of the predictors of this research and the problems inherent in the criteria, it is felt worthwhile to recommend that future researchers in the general area of predictors of physician performance concentrate on at least the following: (1) further validation studies of existing objective medical school selection techniques, (2) validation studies of existing, but heretofore unused psychometric devices which show potential in the area of medical school selection, and (3) the construction and evaluation of new medical school selection devices, which, on the basis of research in other occupational areas, may be of value in predicting performance in the medical setting. The nature of grades in the medical setting should also be studied and perhaps modified. Furthermore, emphasis should be given to evaluating all such predictors in terms of differential prediction (e.g., Is the potential medical student best suited for medical research, surgery, radiology, general practice, etc.), rather than the traditional practice of evaluating predictors or selection devices in terms of a general or global criterion (e.g., Will the student or applicant be a "good" or "bad" doctor?).

In other words, conventional selection procedures based predominantly on premedical academic performance and performance on grade-related tests, have resulted in the acceptance and training of classes of medical students some of whom perform exceptionally well in general practice or in special fields of medical work, others who perform in a satisfactory but undistinguished manner, and still others who exhibit below-average profiles of achievement. Extensive efforts to improve curricula teaching methods and hospital training programs have not thus far greatly modified that pattern of the ultimate product of education. Therefore, it is felt that more investigations should be supported to determine if selection devices exist or can be developed which correlate more closely than present-day techniques with performance in actual practice, thereby producing a higher percentage of superior physicians than we do today. The present studies only represent a modest beginning in such an effort.

Another more general topic related to the prediction and predictors of physician performance concerns the general population or specific samples from which predictions are made. In the present research, and in medical school selection and training, the trend has been to treat the student applicants and the medical student body as a relatively homogeneous assortment of scholars. However, most medical educators will readily attest that any medical school class is composed of a heterogeneous collection of abilities, aptitudes, interests, and backgrounds. Of particular interest to the educator and potentially to the researcher are several subsamples or "types" of students who repeatedly appear in the medical school setting. Thus, it would be helpful to medical educators, admissions committees, and researchers interested in improving medical school selection and prediction to assess the accomplishments and contributions of certain student groups such as the following: (1) students admitted to medical schools with advanced degrees,

(2) candidates who are on admission committees' "alternate lists" and who are eventually accepted or rejected for medical school, (3) students who have scholastic difficulties in medical school (e.g., those promoted on probation, those required to repeat courses or years, or those dismissed from one school who ultimately graduate from another school), (4) the "late bloomers" who after a poor start become outstanding academic performers, (5) older-age students (those, say, who are 30 years or older on admission), (6) "president-of-the-student body" types with perhaps mediocre scholastic records but with very successful campus lives, (7) students coming from families with medical backgrounds, (8) medical school dropouts, (9) financially handicapped students who have to engage excessively in remunerative employment during medical school, and (10) strongly motivated candidates who fail to gain acceptance into medical school. Overall, it is felt that such studies of the student population would serve to isolate sources of variance that might effect, either positively or negatively, the prediction of physician performance.

Before concluding this discussion on the predictors of physician performance which have been studied in this research, further mention should be made of the effects of "restriction of range" on the results obtained. In effect, supporters of this point of view argue that since the physicians studied have survived the multiple hurdles of college, medical school, internship, and residency, they represent the "cream of the crop" of college students. As such, they all possess superior talents and abilities and any sample of such person has a highly restricted range of talents or abilities. Moreover, an inherent prerequisite to measuring and/or predicting a behavioral criterion is that thay have a wide range of variability, talent, or ability. Without this prerequisite range of variability correlations tend to artificially regress toward the regression line, or zero-order correlations would increase in magnitude and thereby show significant relationships between the predictors and the criteria.

The authors, on the other hand, do not feel that this argument is nearly so applicable to the present findings and for the following reasons which are presented in detail in the final report of the 1963 study (Price, Taylor, Richards, & Jacobsen, 1963): First, if correction formulas for restriction of range are applied to the present data both the positive and negative correlations would increase and usually without any change in sign. In other words, the positive validities would become more positive and the negative validities would become more negative. Moreover, a review of the validities in all of the studies will show a slight preponderance of negative correlations. Thus, the effect of removal of restriction of range would be that if any prediction is possible with the present predictors it would tend in the direction of isolating those who perform poorly in actual practice, rather than those who perform well in actual medical practice.

Second, a careful review and application of the correction formulas for direct restriction of range on the present predictors (Gulliksen, 1961) will show that they do not appreciably effect most zero-order correlations. That is to say if correction formulas are applied to zero-order correlations most of the correlations remain essentially zero-order correlations. It is only when the correlations are above the zero-order level that correction formulas yield an appreciable increase in correlation. This is especially true in the present case where one is trying to predict multiple independent criteria.

Third, if one argues that the physicians studied have been indirectly, rather than directly, selected or restricted in range in one criterion dimension of physician performance through its relation to one single selection variable, then the following limitations must be recognized. In the case of indirect restriction of range on a criterion as a result of direct restriction of range on a predictor, the correlation between the direct selector and the indirectly selected criterion in the unrestricted population would have to be at least .87 for the standard deviation of the criterion to be reduced to one-half its original size (Gulliksen, 1961, p. 132). In nearly all cases, it is unrealistic to expect validity coefficients of this magnitude and to expect the standard deviation of the criterion to be reduced to nearly one-half of its original size through restriction of range on one or more selection devices. Moreover, the possibility of such powerful indirect criterion restriction of range becomes even more remote as the number of criterion dimensions increase, in this case upward to 25 to 30 dimensions.

Fourth, from a purely functional point of view, the predictors of this study simply do not predict how well a college or medical student will perform in medical practice. Even if students represent a highly selected sample from the general population, the evidence indicates that on the basis of the presently studied predictors, one cannot estimate on-the-job performance. Since medical schools are vitally concerned with this type of prediction, it seems obvious that investigations should be initiated with other types of predictors that will isolate those who will be superior-level, on-the-job performers from the possibly highly selected sample of medical students.

Fifth, even with extremely generous corrections for restriction of range of talent the current predictors (and this logic applies mostly to academic grades) are inadequate as substitute criteria for on-the-job physician performance. None of the validity coefficients obtained was anywhere near the level expected in parallel criterion forms, which would be required if the predictors were to be used as close approximations of performance on later, more ultimate on-the-job criteria. Further, it is felt highly unlikely that more than five or six physician performance factors could be approximated by the present predictors. In other words, the limitations of reality prevent statistical correlations from yielding anything approaching the high magnitude of correlation needed for the predictors to serve as truly substitute criteria for each and every one of the factorially independent criteria of on-the-job physician performance.

Sixth, a common-sense view of the academic situation indicates it is highly unlikely that students have been sequentially eliminated and retained along the academic ladder on the basis of all of the characteristics needed in physician performance. The present research indicates that at least 25 to 30 characteristics would have to be considered at each of these steps. Undoubtedly, this is a conservative estimate of the dimensions of physician performance. It seems fairly obvious that the traditional medical school selection program and curriculum with its lecture-room emphasis, its paper-and-pencil tests, and its reliance upon textbook material could, at best, tap only a narrow band of the total spectrum of human skills and abilities which are used by physicians in the successful practice of their occupation. Where, for example, is the student graded and evaluated on his honesty and integrity, his motivation to keep abreast of current developments in medicine, and his ability to establish a warm patient doctor relationship?

Seventh, the results of the present study do not suggest that the samples studied are truly homogeneous, which would be implied if one argued for severe restriction of range. In fact, in none of the three physician samples studied does sample homogeneity appear since at least 25 dimensions of performance were found in each case. Such results do not suggest the loss of many, if any, on-the-job factors through homogeneity of samples. They tend to indicate that physician performance is very complex and there are a large variety of relatively independent human performances in the total world-of-work.

These and several other considerations have prompted the authors to conclude that medical school applicants and students are not very restricted in range on academic ability. As far as restriction is concerned on other important variables it is felt if anything, it is minimal. In general, it is believed that the restriction of range argument will apply to only a few of the variables of the present studies, and will not change appreciably the magnitude of most of the validities that were found. At one extreme is the possibility that the predictors are related to each of the 25 or so dimensions of physician performance. In this case, if corrections are made to remove bias from the samples, the correlations between the predictors and the criteria would not be expected to rise very much above the obtained zero-order magnitudes. At the other extreme is the possibility that the predictors are strongly related to only a few of the dimensions of physician performance. In this case, correcting for a selected biased sample would increase considerably the correlation between the predictors with each of a few dimensions, but the correlations with the many, many remaining dimensions would then, of necessity, not rise above their present zero-order levels. In either case, the burden of proof now rests on those currently defending any of the present predictors (including academic grades) as relevant variables for predicting all dimensions of physician performance.

Chapter IX

Summary

Although medical educators have persistently sought improvements and excellence in selecting students for medical school and in the education of those who are admitted, progress has been seriously hampered by at least two unresolved problems: (1) the need for realistic and reliable measures of quality of professional performance following graduation from medical school and (2) the lack of dependable predictors of physician performance or achievement which can be effectively utilized in the selection and promotion of medical students.

Work on the first problem, that of investigating multiple criterion measures of on-the-job performance for physicians, was pioneered by Price, Taylor, Richards, & Jacobsen (1963). In this effort 80 performance measures were collected, analyzed, and reduced or synthesized into approximately 25 relatively independent factors (criterion measures) for each of three different physician samples: medical school faculty, specialists, and general practitioners. The completion of that study made possible for the first time an exploratory investigation of the second problem--validating predictive devices against on-the-job criteria of physician performances.

The present study was initiated with the intention of validating three traditional predictive devices against the criterion measures gathered on expanded samples of the above three types of physicians. Specifically, the criteria consisted of the factor scores derived from the 80 measures appropriate for each sample of physicians. These 80 measures were obtained on a large pool of physicians during the previous study in 1963. The remaining criterion data collected during this present study were from additional physicians who had not previously participated in this research program, some of whom were alumni of the Utah Medical College but were now non-residents of the State of Utah.

The 1963 study yielded specific factor patterns for the subgroups involved in that study; those factor analytic results were used for comparison purposes in the present expanded sample study to help to get some idea of factor reliability. Coefficients of congruency were computed as a statistical check for the desired reliability.

Several questions are implicit in the present study and are being made explicit in the hope that medical educators will be further challenged and encouraged to question their own procedures for selection. One obvious question arises as to the adequacy of selection devices in use. This report generally found much more ineffectiveness than expected in the selection procedures investigated. One such procedure is the use of the grade-point average as a major basis for admission to medical school. A review of the literature indicated that selection on this basis has not been subjected to continuous and systematic evaluation. Where studies have been done, such grade point averages have not demonstrated a high level of validity for predicting either performance in medical school, or later, and more importantly, on-the-job performance and any statistical corrections for these validity coefficients (e.g., restriction of range formulas) will generally not change this total picture. Correlation coefficients predicting further academic success in medical school from premedical grade point averages (GPA) ranged from essentially zero-order-of-magnitude correlations to occasional .40's and .50's depending upon the sample used.

Essentially, however, the vast majority of correlations remain surprisingly and disappointingly low, and the picture for grades as predictors becomes discouragingly worse when the more crucial criteria of various aspects of professional performance on the job, as measured to date, are used--in fact, grades approach negligible value as predictors of physician performance, notwithstanding all justifiable corrections on the obtained validity coefficients.

An additional instrument applied by medical educators, which again reveals inadequacies, is the Medical College Admission Test (MCAT). This instrument, interestingly enough, was incorporated in selection programs of medical schools as a replacement test before much evidence was available concerning its validity. As with GPA it was found that uncorrected correlations between MCAT scores and grade-point averages throughout medical school ranged from correlations of essentially zero-order magnitude to the .30's and .40's in a few instances. The literature reviewed in this report indicated a disappointing failure on the part of the MCAT even to predict academic performance, let alone intern or on-the-job performance; this failure raises some doubts about its relevance, usefulness, and desirability as a heavily weighted selection device.

It was found that in a few instances criteria other than medical school performance have been used in an attempt to validate the MCAT as a predictor. These studies merely reiterated the findings already reported. Ratings of students by their faculty on variables thought to be crucial for later on-the-job performance are an example of such criteria (Gough, Hall, & Harris, 1963). Again correlations approaching zero-order magnitude seem to be the primary results obtained.

Another heavily relied upon and frequently used evaluating measure is the admissions interview. Similar results to those reported above were found to exist with respect to the predictive validity of this type of measure for academic success. Moreover, a serious deficiency was noted since there emerges almost an absence of any attempts to validate the admissions interview against the important on-the-job performance measures--however, in one earlier attempt on our part there was some promise that interviews may at least crudely uncover and measure some characteristics called for more in interns than in medical students.

Having discussed some of the previous findings concerning frequently used predictors, the authors decided to study grade point averages and MCAT scores and further to focus considerable attention in the present study upon another type of predictor, the Biographical Inventory. It was found that biographical information has been in use for many, many years in various areas. Since 1940 a great increase in its application has resulted in the emergence of potentially powerful predictive devices. Biographical scores have successfully correlated with criteria such as academic achievement and creative scientific attainments, with cross validity coefficients ranging up to the .60's (e.g., Hansen, 1950; Taylor, Ellison, & Tucker, 1965). Prediction of labor turnover rate, "most desirable" and "least desirable" hospital aids, combat performance, and many other performance criteria further revealed the versatility of the biographical approach. The experience of many industrial psychologists is that it is usually better than other devices for predicting job performances in high level work (Henry, 1965).

Applying the Biographical Inventory approach to medical selections has produced some contradictory findings. Yet again, some versatility and successful prediction have emerged. A general review of the literature optimistically indicated probable success for the Biographical Inventory approach even in the complexity of medical school selection. With this orientation and from extensive previous experience in our laboratory, the present study was directed toward formulating a comprehensive, well-developed Biographical Inventory for Medicine (BIM).

Construction of the BIM began by drawing from several available sources which were used as bases for choosing or constructing items to be placed in an item pool. The items in turn were carefully reviewed with reference to the appropriate criteria and were altered when necessary. A major source of ideas for items was the interview information together with the experience of our staff during our earlier physician performance criterion study. Each item was structured in multiple-choice format, consisting of a question and [illegible] judges deemed qualified to make the judgments rated each [illegible] of on-the-job performance. A content sort [illegible] with par- [illegible]

In the first study only 10 predictor scores were used in predicting medical school performance since grades in medical school in this study were considered as criteria, not predictors. The ten predictor scores were validated against the following three criteria dealing with academic achievement in medical school: (1) grade-point average for the First Two Years of Medical School; (2) grade-point average for the Last Two Years of Medical School; and (3) cumulative grade-point average for all four years of medical school. Validity coefficients against these grade-point averages were all essentially correlations of zero-order magnitude, which generally agreed with the accumulating body of evidence already reviewed. The finding was that present selection instruments for medical school achievement need considerable improvement or supplementation to be very worthwhile indicators of medical school performance. The essentially zero results obtained with the BIM as a predictor were not altogether unexpected since the BIM items had been deliberately collected and constructed solely for the different task of predicting on-the-job performance, not academic performance. In general, the tentative failure of all of the predictors strongly emphasizes the need for vigorous research with new measures and predictors of medical school performance--recognizing that the results also may raise some questions about the nature of education and grades in medical school.

In the remaining studies, the total sample of 754 physicians was divided into three groups--Full-time Medical School Faculty, General Practitioners, and Specialists.

The Full-time Medical School Faculty sample (N=61) was drawn from a population of 118 members of the full-time faculty of the University of Utah College of Medicine who have earned a doctoral degree (M.D. or Ph.D. or both) and 20 graduates of the University of Utah College of Medicine who hold full-time faculty appointments outside of Utah. The 80 criterion measures for each of the 61 participants were intercorrelated and factor analyzed. Coefficients of congruency between this factor pattern and a previously obtained factor analysis of the Utah group of 102 full-time academicians (Price, Taylor, Richards, & Jacobsen, 1963), revealed essentially no critical differences between factor patterns. Outwardly, this established some degree of reliability between the factor pattern generated previously and the factor pattern generated in this study.

Factor scores were then computed for each physician for each of the 25 factored dimensions of physician performance. Biserial correlations were obtained for each of the item-alternatives of the BIM with each of the 25 factor scores. This resulted in the construction of a key of "acceptable" item-alternatives unique to each criterion measure or factor. The specifications for building the 25 keys were that at least 15 per cent of the participating general practitioners had to respond to a single item-alternative and that this item-alternative had to have a ±.15 correlation with at least one of the criterion factor scores. Selected items were in turn weighted either +1 or -1 according to the direction of their biserial correlations. Each physician's BIM responses were then scored according to the newly devised key. For each of the 25 criteria this scoring procedure produced four sub-scores and a total score for each participating physician. These five scores were then correlated with their appropriate criterion factor scores to yield indices of the BIM's validity.

In determining the efficiency of the present predictors of performance in the medical faculty, concurrent validities on the admittedly small half samples were computed for appropriate keys for each of the five types of BIM measures against each of the 25 factor scores. The concurrent validities ranged from .51 to .92 with a mean correlation of .75. As expected upon cross-validation, the validity coefficients dropped in magnitude to values ranging from -.33 to .58 with a mean of .08. Admittedly, the loss in validity was greater in most cases than had been found in the earlier Utah biographical studies of NASA scientists. From the finding in our preceding project of the vast complexity of professional performance, we recognized that too great of a demand was being placed on any single selection device to expect it to be valid for each and every one of 25 different dimensions of job performance. Nonetheless, as is indicated by the range of cross validity coefficients, there were some sections of the BIM which added to the prediction of the selected criteria. To be exact, 7 of the 25 criterion dimensions were predicted at the .05 level of significance, which is not too bad in terms of the above considerations together with the small sample size for this medical faculty group.

When the premedical and medical school GPA measures were used as predictors of faculty performance the results generally followed the above pattern. Again, however, there were some exceptions, since nine of the criteria were successfully predicted at the .05 level of significance. One puzzling fact which complicates any attempts at explanation is that three of these nine validities were negative. This becomes disturbing, knowing that grades both before and during medical school, are used with a great deal of weight in selection and always as if they are positively related to all future criteria of professional performance

In total, it was found that 14 of the 25 criteria dimensions were predicted by one or more of the seven types of predictors used for this medical faculty group. This amounted to over 50% of the 25 criteria being predictable. But since most of them were not predicted to any high degree, the results suggested that the search for relevant predictors is still strongly needed. And focused efforts on predicting subsets of fewer criterion dimensions at one time also are very much warranted.

General practitioners (N=242) drawn primarily from a population of approximately 400 physicians who were practicing general medicine in the State of Utah formed the next group studied. Also included within this sample were 34 out-of-state University of Utah Alumni out of approximately 100 such alumni who practice outside of Utah. As was the procedure with the Full-time Medical School Faculty group, the particular set of 80 criterion measures appropriate for the General Practitioners were intercorrelated and factor analyzed, yielding 30 orthogonal factors or independent criterion measures. Coefficients of congruency computed between these 30 factors and corresponding factors of the 1963 study were sufficiently high for 17 factors to consider them to be the same factors. The other 13 factors were considerably different, requiring new interpretations and descriptions; however, an analytical description and interpretation revealed enough similarities to give 5 of these remaining 13 factors the same titles as had been given to corresponding factors of the 1963 study.

Thirty factor scores were calculated for every physician for each of the thirty dimensions of physician performance. The concurrent initial validity coefficients for appropriate biographical keys ranged from .39 to .84 with mean coefficients of .62, .49, .50, .63, and .78 for the Parents, Home, and School Life; College Life; Adult Life: Professional Life; and Total Score sub-scores, respectively. In the cross validation study for this subgroup, the total general practitioner sample was randomly divided into two equal sub-samples. Keys were constructed on one sub-sample and applied to the other sub-sample. The validity coefficients dropped again, mostly to zero-order magnitude, indicating a general failure of the BIM to predict each and every one of the present complex domain of physician performance represented by the 30 criterion factor scores used. Although this was the general picture of the results, several statistically significant relationships were found upon examining individual validities. These results suggest the potential assistance the BIM can lend in prediction of professional attainments if certain refinements and developments can be undertaken. In total, 9 of the 30 dimensions of physician performance were successfully predicted by BIM scores in the cross-validation study.

The GPA's were found to be quite inadequate as predictors of general practitioner physician performance. The average predictive validity across all criterion measures was .02 for premedical School GPA, .03 for GPA for the First Two Years of Medical School, and .05 for GPA for the Last Two Years of Medical School. These three measures could be used to predict 9 of the 30 criterion factors, 5 of which the BIM measures had also successfully predicted. Of these 9 significant correlations, however, 4 were found to be in the negative direction, again making explanations and recommendations for continued official selection use difficult.

Very similar results were found in using the MCAT sub-scores as predictors where these were available. Most of the correlations for these test scores across the 30 criteria were of zero order magnitude, although 10 of the 30 criteria were successfully predicted by one of these scores at the .01 level of probability. Out of the 120 validity coefficients for these four MCAT subscores, 16 were significantly greater than zero, but 13 of these 16 significant validities were negative. For an official nationally-used selection test, it is a troublesome finding, indeed, that so few of its validity coefficients were significant and that 81% (13/16th) of these were negative validities.

The high intercorrelations among the four subtests of the MCAT also are troublesome on two counts: (1) ideally, subtest scores should be as unrelated as possible to maximize new information and combined predictive power, and (2) high intercorrelations (especially as found on the 242 general practitioners where all but one of the intercorrelations were between .57 and .75) argue strongly against much restriction of range in these scores on this sample. Any corrections for restriction of range on the general practitioner sample would yield even higher intercorrelations and would still, in all likelihood, lead to the conclusion that the large majority of the significant validities for the MCAT scores against physician performance were negative.

In total, it was found that 20 of the 30 criterion factors for general practitioners were found to be significantly predicted by one or more of the twelve types of predictor measures. Furthermore, every specific predictor score correlated significantly with at least one of the criterion factors. Such a finding emphasizes the value of a combination of all of the predictors tried here but also indicates that more vigorous research with a large variety of other potential predictors is needed if there is to be continuing advancement in this area of prediction of physician performances. The fact that the significant validities were primarily in the .20's sharply revealed the incompleteness of the prediction of the criteria. Nonetheless, a first step has been made and further investigation should be pursued in an attempt to account for more of the remaining criterion variance in each dimension of performance.

In studying the final group of 207 Specialists drawn from a population of 557 certified specialists, the same procedures were followed as for the previous two groups in the study. Since this group consisted both of alumni of the University of Utah College of Medicine practicing in the State of Utah, and of alumni practicing outside of Utah, appropriate t-tests between these two groups on the twelve predictors used did uncover some significant differences between sub-samples. However, the criterion data of the Utah and non-Utah specialists were pooled despite several apparent statistically significant differences. Most of these differences were found to become minimized and fall below the significance level when the variable measuring the number of years of professional experience the physician had received was "partialled out." Through inspection, analytical description, and careful scrutinizing, those remaining factors were discussed and titled. When similarities were evident between the previous factor analysis and the present factor pattern, these were commented upon. One complication between the previous and the present study of specialists involves whether to include non-certified but practicing specialists in with certified specialists or whether to place them into the general practitioner sample. A different procedure was tried in our first project than in our second and the troublesome outcomes lead us to wonder whether non-certified specialists should henceforth be studied as a group all by themselves.

Intercorrelations among the three GPA and four MCAT scores on this total specialist sample revealed similar results to those of other investigations. Primarily, the premedical GPA correlated moderately high with the GPA for the First Two Years of Medical School and then dropped quite decisively for the Last Two Years. A surprising finding was the high magnitude of the intercorrelation between GPA for the first two years of medical school and the last two years of medical school. This suggests that medical school performance may be relatively stable for those students who eventually go into specialty practice.

Unfortunately a second set of biserial correlations for the biographical inventory on this group was not computed when a computer error in the first set was discovered too late to allow further work to be accomplished. The lack of adequate funds was the primary factor prohibiting this last computational re-run. Nonetheless, the general findings for predictors already mentioned for the other two groups would appear to hold also for this group from our examination of the available evidence.

In the discussion chapter, we have reviewed the results across the entire project and have presented several possible reasons including sample differences as partial explanations of the low reliabilities found between the factors generated in the present study and the factors produced in the 1963 study. Such possible explanations were offered and discussed, especially the noticeable changes in sample from one study to the other, and the fact that no method was available to modify the factor analytic process to provide the maximum congruency between factors.

Several probable reasons were mentioned which could account for the low correlations between predictors and criteria on each physician sample studied. Both predictors and criteria have inherent difficulties and with these in view, future research recommendations have been proposed. Implicit here were problems of restriction of range, but several reasons were presented which have prompted the authors to conclude that medical school applicants and students are not as highly restricted in range on academic abilities as is often assumed. Furthermore, it was felt that restriction of range was minimal on the other important abilities needed in the 25 or more dimensions of physician performance on the job. In general, it was concluded that the restriction of range argument could only apply to a few variables of the present study without greatly changing the general results obtained. And in most cases, these corrections would have to be applied to some negative validities as well as some positive ones.

It becomes evident to all persons interested in the prediction of physician performance that no single predictive device now in use can meet the stringent requirements placed upon it in predicting the multi-faceted dimensions which comprise total physician performance. And these outcomes would probably not have been much different if a more complex global criterion (obtained by combining several of the present criteria) had been used (though we have not yet had the opportunity to do the computation on our data needed to demonstrate this). As was mentioned at the beginning of this chapter, selecting and developing appropriate performance measures as criteria is equally as important and essential as developing adequate devices to be used as predictors. This research endeavor has penetrated some of the many facets of the performance-prediction dilemma in an attempt to shed some light upon the problem. It would be presumptuous and unrealistic to think that anything more than a first attempt has been initiated; however, the surface has been scratched and many clues and beneficial segments of information have been assembled which give indications for further investigation. As a result of the findings in this project, no one can realistically say there are not grave unsolved problems in the selection of those who will become physicians. Though the problems ahead appear to be difficult, to us, they do not loom impossible. And subdividing the performance areas for physicians into smaller criterion sets for intensive study seem highly warranted, as do further explorations into other as yet unmeasured areas of physician performance.

In summary, it should be emphasized that there were so many criterion measures used that it is not surprising to discover that some of the validity coefficients fell below the required significance level. To predict performance in each of 30 different criterion dimensions is a most difficult requirement to place upon any single type of measuring instrument or any one battery of instruments. Refinement and extension of both the criteria and the predictors are necessary steps ahead in the process of improved prediction. Further progress remains optimistically close at hand if research can be continued and cooperation can be solicited.

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After this final report was completed and in the process of reproduction, we noticed a most pertinent editorial by Dael Wolfle in Science, Sept. 24, 1965, 149, p. 1453. This editorial shows a real awakening to our type of findings on professional performance not only on the complexity of talents called for but also on the low or zero validities of both grades and academic selection tests and of the elusiveness of good predictors of career performance. Our findings on the present project and on our previous project on the Measurement of Physician Performance document Wolfle's comments.

Wolfle's editorial concludes with the following: ". . . as both everyday observation and more precise psychological studies demonstrate, college grades and the measures that best predict them are relatively poor predictors of other kinds of achievement and of later success in most professional fields. Stories of the class dunce who turns out to be the most successful alumnus are at best atypical, but the correlations between intelligence or class standing and later success in science, medicine, law, military life, or any other profession are usually discouragingly close to zero. Completely accurate predictions could never be expected; other variables are important in professional success, and much happens after the school years are over. Yet it is nevertheless true that good predictors of professional accomplishment are stubbornly elusive.

Here, then, is a nice problem for anyone interested in the development and utilization of all the diverse forms of human talent. Research on this complex problem goes on, and more should be encouraged. It is useful to know how to select students who can earn good grades. It would be more useful to know better how to select those who will be real achievers in a variety of fields."

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APPENDIX A

Biographical Information Inventory

Parents, Home, and School Life

1. How many brothers and sisters did you have in your immediate family?
   - A. 0
   - B. 1
   - C. 2
   - D. 3
   - E. More than three

2. Which of the following best describes your position in your family?
   - A. Oldest child
   - B. Second oldest child
   - C. Third oldest child
   - D. Fourth oldest child
   - E. Younger than fourth oldest child

3. How often did either of your parents (or guardian) read to you as a child (up to 10 years)?
   - A. Very frequently
   - B. Frequently
   - C. Sometimes
   - D. Seldom
   - E. Never

4. What kind of pre-elementary school training did you have (i.e., before the first grade)?
   - A. Attended nursery school only
   - B. Attended kindergarten only
   - C. Attended both nursery school and kindergarten
   - D. Attended neither nursery school nor kindergarten
   - E. Had pre-elementary school training but not in nursery school or kindergarten

5. When did you first have your own banking account?
   - A. 6 years or younger
   - B. 7-10
   - C. 11-14
   - D. 15 or over
   - E. Never had one

6. Which of the following tended to be the most distressing to you in your youth (6 to 10 years)?
   - A. Unpopularity with boys
   - B. Shyness with girls
   - C. Lack of achievement in school
   - D. Unpopularity with teachers
   - E. None of the above was distressing to me

7. Compared to what you were capable of doing, how well did you do in elementary school?
   - A. I always performed at my maximum capacity
   - B. I usually performed at my maximun capacity
   - C. I usually performed slightly below my capacity
   - D. I usually performed considerably below my capacity
   - E. I usually performed far below my capacity

8. During elementary school, how do you feel your teachers would have evaluated you on a "desirable students" scale (consider such things as cooperativeness, tardiness, boistriousness, etc.)?
   - A. Very desirable
   - B. Somewhat desirable
   - C. Average
   - D. Somewhat undesirable
   - E. Very undesirable

9. During your adolescent years (10 to 14 years) how often did you manage "to get your own way" with your associates and friends, (e.g., play the game you wanted to play, etc.)?
   - A. All the time
   - B. Quite frequently
   - C. Occasionally
   - D. Seldom
   - E. Rarely or never

Instructions for questions 10 to 14: Indicate how much you enjoyed each of the following during your childhood (up to 10 years). Circle the appropriate letter for each one on the list.

	Not at all (A)	To a small extent (B)	To some extent (C)	To a large extent (D)	To a very large extent (E)
10. Chemistry or biology set........	A	B	C	D	E
11. Hand tools.........	A	B	C	D	E
12. Power tools........	A	B	C	D	E
13. Private room......	A	B	C	D	E
14. Library...........	A	B	C	D	E

15. How often did you use the school library or public library during your youth (6 to 10 years)?
    - A. Very frequently
    - B. Frequently
    - C. Occasionally
    - D. Rarely
    - E. Never

16. During your childhood (up to 10 years), how often did you attend church?
    - A. Very frequently
    - B. Frequently
    - C. Occasionally
    - D. Rarely
    - E. Never

17. How interested were you in making repairs around the house up to the age of 18?
    - A. Strong interest
    - B. Mild interest
    - C. Indifferent
    - D. Mild dislike
    - E. Strong dislike

18. Which statement best describes the kinds of toys you played with most frequently up to the age of 12?
    - A. Manipulative or complex toys such as erector sets and chemistry sets
    - B. Manufactured toys, such as cars, tanks, and planes
    - C. Artistic toys, such as paint sets and drawing sets
    - D. Home-made toys made by yourself or others in the family
    - E. Sports equipment, such as baseball and basketball equipment

19. What position do you think you had in the neighborhood gang during your youth (6 to 10 years)?
    - A. A member
    - B. A leader
    - C. A leader "behind the throne"
    - D. I did not belong to a gang
    - E. There was no gang

20. Which of the following best describes the trend of your family's standard of living while you were growing up?
    - A. Some decline in standard of living
    - B. Approximately a constant standard of living
    - C. Some increase in standard of living
    - D. Marked increase in standard of living
    - E. Marked fluctuation in standard of living

21. How would you describe your ambition when you were an adolescent (10 to 14 years)?
    - A. More ambitious than anyone I knew
    - B. Very ambitious
    - C. Somewhat ambitious
    - D. Rarely ambitious
    - E. Not ambitious at all

22. How often during your adolescence (10 to 14 years) did you have a desire to be alone, to pursue your own interests and thoughts?
    - A. Very frequently
    - B. Frequently
    - C. Occasionally
    - D. Infrequently
    - E. Never

23. To what extent did you have feelings of doubt about your intellectual abilities during your childhood or adolescence (up to 14 years)?
    - A. To a great extent
    - B. To some extent
    - C. To a small extent
    - D. Not at all
    - E. Was not particularly aware of my intellectual abilities

24. How much musical training did you receive during your youth (6 to 10 years)?
    - A. A great deal
    - B. Quite a bit
    - C. Some
    - D. A little
    - E. None

25. What was the highest level of achievement that you attained in the Boy Scouts?
    - A. I never joined because I wasn't interested in the Scouts
    - B. I never joined because there wasn't a Scout troop in my locality
    - C. Tenderfoot or 2nd Class
    - D. 1st Class or Star
    - E. Life or Eagle

26. How old were you when a teacher first had a significant influence on you?
    - A. No teacher greatly influenced me
    - B. 6-9
    - C. 10-12
    - D. 13-15
    - E. 16 or older

27. At what age did you first develop a real interest in mathematics?
    - A. Under 9
    - B. 10-14
    - C. 15-18
    - D. Over 18
    - E. I never did

28. About how many times did your father change his occupation up to the time you were 18 years old?
    - A. Never changed
    - B. Changed once
    - C. Changed twice
    - D. Changed three times
    - E. Changed four or more times

29. Up to the age of 18, how often did you read biographies or autobiographies?
    - A. Very frequently
    - B. Frequently
    - C. Occasionally
    - D. Rarely
    - E. Never did

30. How important did a college education seem to you when you were in high school (grades 9 to 12)?
    - A. Of highest importance
    - B. Very important
    - C. Somewhat important
    - D. Didn't care one way or another
    - E. Felt college wasn't necessary

31. About what percentage of the students in your graduating class did you surpass academically when you graduated from high school?
    - A. 90-99%
    - B. 80-89%
    - C. 70-79%
    - D. 50-69%
    - E. Under 50%

32. Which of the following best describes the academic standards of the high school from which you graduated?
    - A. Exceptionally high academic standards
    - B. High academic standards
    - C. Somewhat high academic standards
    - D. Somewhat low academic standards
    - E. Low academic standards

33. During junior high school and high school, how would your teachers have evaluated you on a "desirable students" scale (consider such things as cooperativeness, tardiness, boistriousness, etc.)?
    - A. Very desirable
    - B. Somewhat desirable
    - C. Average
    - D. Somewhat undesirable
    - E. Very undesirable

34. In general, how good a teaching job do you feel your high school science teachers did (grades 9 to 12)?
    - A. Exceptional
    - B. Definitely above average
    - C. Somewhat above average
    - D. About average
    - E. Below average

35. How often did you strive for top grades when you were in high school (grades 9 to 12)?
    - A. Very frequently
    - B. Frequently
    - C. Occasionally
    - D. Rarely
    - E. Never

36. How many times did you play hooky from class in high school (grades 9 to 12)?
    - A. Very frequently
    - B. Frequently
    - C. Occasionally
    - D. Rarely
    - E. Never

37. During your junior high and high school years, how frequently did you appear in a school program (assembly, play, opera) in which you were in front of an audience?
    - A. Very frequently
    - B. Frequently
    - C. Occasionally
    - D. Rarely
    - E. Never

38. How often during high school (grades 9 to 12) did you study with other students?
    - A. Very frequently
    - B. Frequently
    - C. Sometimes
    - D. Seldom
    - E. Never

39. Compared to what you were capable of doing, how well did you do in high school (grades 9 to 12)?
    - A. I always performed at my maximum capacity
    - B. I usually performed at my maximum capacity
    - C. I usually performed slightly below my capacity
    - D. I usually performed considerably below my capacity
    - E. I usually performed far below my capacity

40. How would you best describe your curiosity when you were in high school (grades 9 to 12)?
    - A. Very curious about many things
    - B. More curious than average about many things
    - C. More curious than average about some things
    - D. About average in curiosity
    - E. Probably less curious than average

41. How frequently did your mother assist you with your home work during junior high school and high school?
    - A. Very frequently
    - B. Frequently
    - C. Sometimes
    - D. Seldom
    - E. Never

42. How frequently did your father assist you with your home work during junior high school and high school?
    - A. Very frequently
    - B. Frequently
    - C. Sometimes
    - D. Seldom
    - E. Never

43. During high school (grades 9 to 12) who made most of the decisions about your activities and restrictions?
    - A. Generally my father
    - B. Generally my mother
    - C. About equally by my mother and father
    - D. Usually someone other than my parents or myself
    - E. Generally left up to me

44. Before the age of 18, where did you live most of your life?
    - A. A farm or a small town (less than 1,000 pop.)
    - B. A town (1,000-10,000 pop.)
    - C. A small city (10,000-50,000 pop.)
    - D. A city (50,000-250,000 pop.)
    - E. A large city (over 250,000 pop.)
    - F. Other (specify)______________

45. How old were you when you first obtained your own car?
    - A. Under 16
    - B. 16-17
    - C. 18-19
    - D. 20-24
    - E. Over 24

46. On the average, how many times a week during your last two years of high school did you have a car for your personal use?
    - A. None
    - B. Once a week
    - C. 2 to 3 times a week
    - D. 4 to 7 times a week
    - E. All the time (I had my own car)

47. Which of the following best describes your parent's attitude toward your conduct during high school (grades 9 to 12)?
    - A. Felt I was extremely difficult to manage
    - B. Felt I was usually difficult to manage
    - C. Felt I was fairly difficult to manage
    - D. Felt I was seldom difficult to manage
    - E. Felt I was not difficult to manage
    - F. Other (specify)________________

48. About how many hours did you work per week on a paying job when you were in your last year of high school?
    - A. 35-40
    - B. 20-34
    - C. 10-19
    - D. 1-9
    - E. I did not work

49. About how many different jobs, part time or full time, had you held by the time you were 18?
    - A. None
    - B. 1-2
    - C. 3-4
    - D. 5-6
    - E. 7 or more

50. Which of the following best describes your home life up to the age of 18?
    - A. Very happy
    - B. Happy
    - C. Rather happy
    - D. Rather unhappy
    - E. Very unhappy
    - F. Other (specify)________________

51. Up to your 18th birthday, what was the usual financial level of your parents?
    - A. Very high
    - B. Well above average
    - C. Just above average
    - D. Average
    - E. Below average
    - F. Other (specify)________________

52. How much emphasis did your parents place on educational achievement?
    - A. Great emphasis
    - B. Much emphasis
    - C. Some emphasis
    - D. Little emphasis
    - E. No emphasis

53. During your high school years (grades 9 to 12), how often did you and your mother discuss science, world affairs, social issues, and other similar topics?
    - A. Very frequently
    - B. Frequently
    - C. Sometimes
    - D. Seldom
    - E. Never

54. How often did you have disagreement, discord, or friction with your mother before you entered college?
    - A. Very frequently
    - B. Frequently
    - C. Sometimes
    - D. Seldom
    - E. Never

55. During your high school years (grades 9 to 12), how often did you and your father discuss science, world affairs, social issues, and other similar topics?
    - A. Very frequently
    - B. Frequently
    - C. Sometimes
    - D. Seldom
    - E. Never

56. Compared to others, how much outside reading did you do between the ages of 12 and 18 (excluding school work)?
    - A. Read everything that looked interesting
    - B. Read during a large part of my free time
    - C. Read occasionally
    - D. Read seldom
    - E. Never read

57. Which of the following best describes how your father usually handled restrictive regulations (e.g., dating, use of the family car) with you during your high school years (grades 9 to 12)?
    - A. Father usually let me do as I pleased
    - B. We discussed the problem and reached an agreement
    - C. We discussed the problem, then father encouraged me to do what he felt was best
    - D. We discussed the problem, then father told me what to do
    - E. We seldom discussed the problem; father usually told me what to do

58. What is the largest number of people your father employed or supervised at any one time up to the time you were 18 years old?
    - A. Over 100
    - B. 15-100
    - C. 3-15
    - D. One or two
    - E. None

59. Which of the following best describes your father's occupation when you were 18 years old?
    - A. Unskilled or semi-skilled laborer
    - B. Skilled laborer
    - C. White collar worker
    - D. Business man
    - E. Professional
    - F. Other (specify)________________

60. How often did you attend church up to the age of 18?
    - A. Very frequently
    - B. Frequently
    - C. Sometimes
    - D. Seldom
    - E. Never

61. How would you describe your high school (grades 9 to 12) social experiences?
    - A. Very extensive--many activities and friends
    - B. Fairly extensive--quite a few activities and friends
    - C. Somewhat limiated in activities and friends
    - D. Limited--only a little social activity and few friends
    - E. Practically no social life

62. How did you spend most of your summer vacations when you were in high school (grades 9 to 12)?
    - A. Loafed
    - B. Worked occasionally
    - C. Worked part-time consistently
    - D. Worked full-time
    - E. Spent only on hobbies or interests
    - F. Other (specify)________________

63. During your high school years (grades 9 to 12) which type of personality did you desire for yourself?
    - A. Intellectual, logical
    - B. Social; gregarious
    - C. Humorous, witty
    - D. Clever, inventive
    - E. All-round "American boy"

64. How much freedom did your mother give you during your childhood and adolescence (up to 14 years)?
    - A. Complete freedom
    - B. Almost complete freedom
    - C. A moderate amount of freedom
    - D. A fair amount of freedom
    - E. Almost no freedom

65. To what extent was your mother active in trying to improve your family's place in life?
    - A. Very active
    - B. Quite active
    - C. Normally active
    - D. Occasionally active
    - E. Not at all

Instructions for questions 66 to 71: Indicate the approximate age that you first played or experimented with each of the things listed below. Circle the appropriate letter for each thing.

	Never did (A)	Over 18 years (B)	13-18 years (C)	8-12 years (D)	Before 8 years (E)
66. Crystal radio sets	A	B	C	D	E
67. Chemistry kits...	A	B	C	D	E
68. Electromagnets...	A	B	C	D	E
69. Microscopes......	A	B	C	D	E
70. Telescopes.......	A	B	C	D	E
71. Power tools.......	A	B	C	D	E

72. Which of the following best describes your mother's educational level?
    - A. Grade school, but no high school
    - B. Attended high school, but didn't graduate
    - C. Graduated from high school
    - D. Attended college, but didn't graduate
    - E. Graduated from college

73. How would you estimate the intelligence of your mother?
    - A. Below average
    - B. Average
    - C. Above average
    - D. Superior
    - E. Very superior

74. Which of the following best describes the leisure-time reading activities of your mother?
    - A. Always had a book, journal, or magazine that she was reading
    - B. Usually had a book, journal, or magazine that she was reading
    - C. Occasionally had a book, journal or magazine that she was reading
    - D. Seldom had a book, journal, or magazine that she was reading
    - E. Rarely had a book, journal, or magazine that she was reading

75. To what extent was your mother active in civic and social activities (e.g., Red Cross, bridge clubs)?
    - A. Very active
    - B. Frequently active
    - C. Occasionally active
    - D. Rarely active
    - E. Never active

76. Which of the following best describe your mother's social skills (ability to get along with other people)?
    - A. Definitely above average
    - B. Above average
    - C. Average
    - D. Below average
    - E. Definitely below average

77. To what extent was your father active in civic and social activities (e.g., Lion's Club, Boy Scouts, Chamber of Commerce)?
    - A. Very active
    - B. Frequently active
    - C. Occasionally active
    - D. Rarely active
    - E. Never active

78. Which of the following best describes your father's social skills (ability to get along with other people)?
    - A. Definitely outstanding
    - B. Outstanding
    - C. Average
    - D. Below average
    - E. Definitely below average

79. Which of the following best describes the leisure-time reading activities of your father?
    - A. Always had a book, journal, or magazine he was reading
    - B. Usually had a book, journal, or magazine he was reading
    - C. Occasionally had a book, journal, or magazine he was reading
    - D. Seldom had a book, journal, or magazine he was reading
    - E. Rarely had a book, journal, or magazine he was reading

80. Which of the following best describes your father's educational level?
    - A. Grade school, but no high school
    - B. Attended high school, but didn't graduate
    - C. Graduated from high school
    - D. Attended college, but didn't graduate
    - E. Graduated from college

81. Taking into consideration your father's educational level, how would you rate his overall occupational achievement?
    - A. Exceptional
    - B. Above average
    - C. Average
    - D. Below average
    - E. Poor

82. How much emphasis did your father place on your going to college?
    - A. Great emphasis
    - B. Much emphasis
    - C. Some emphasis
    - D. Little emphasis
    - E. No emphasis

83. To what extent did your father expect high standards of achievement from you (e.g., good grades, excelling in athletics)?
    - A. To a very great extent
    - B. To a great extent
    - C. To some extent
    - D. To a small extent
    - E. Not at all

84. Which one of the following had the best sense of humor in your immediate family?
    - A. Father
    - B. Mother
    - C. A brother
    - D. A sister
    - E. Myself

85. Which of the following best describes your father's general attitude toward his occupation (s)?
    - A. His single, most important interest in life
    - B. A major, dominant interest in life
    - C. Interested, but not at the expense of other activities
    - D. Disinterested, but accepted or tolerated it
    - E. Disliked it
    - F. Other (specify)________________

86. As compared to what your parents gave you, how much independence do you give to your children (if you have no children, answer as if you did have them)?
    - A. Considerably more
    - B. Somewhat more
    - C. About the same
    - D. Somewhat less
    - E. Considerably less

87. As compared with what your parents gave you, how much attention do you give to your children (if you have no children, answer as if you did have them)?
    - A. Considerably more
    - B. Somewhat more
    - C. About the same
    - D. Somewhat less
    - E. Considerably less

88. During your youth (6 to 10 years), to what extent did your parents openly encourage you to take an interest in discovering things for yourself, as in science-like activities, etc.?
    - A. To a very great extent
    - B. To a great extent
    - C. To some extent
    - D. To a small extent
    - E. Not at all

89. Compared to your friends, how many books did you have in your home during your youth (6 to 10 years)?
    - A. Many more than my friends
    - B. A few more than my friends
    - C. About the same as my friends
    - D. A few less than my friends
    - E. Many less than my friends

College Life
(premedical school and medical school)

90. Which of the following best describes your study habits in premedical school?
    - A. Exceptional
    - B. Very good
    - C. Good
    - D. Rather poor
    - E. Poor
    - F. Other (specify)________________

91. What was your approximate grade-point average in premedical school?
    - A. A minus or better
    - B. B plus
    - C. B
    - D. B minus
    - E. C plus or lower

92. How often did you tend to compete for top grades while you were in premedical school?
    - A. Very frequently
    - B. Frequently
    - C. Occasionally
    - D. Rarely
    - E. Never

93. During your premedical schooling how often did you worry about your school work and grades?
    - A. Very often
    - B. Often
    - C. Occasionally
    - D. Rarely
    - E. Never

94. How often during your premedical years did you study with other students?
    - A. Very frequently
    - B. Frequently
    - C. Sometimes
    - D. Seldom
    - E. Never

95. Compared to what you were capable of doing, how well did you do in premedical school?
    - A. I always performed at my maximum capacity
    - B. I usually performed at my maximum capacity
    - C. I usually performed slightly below my capacity
    - D. I usually performed considerably below my capacity
    - E. I usually performed far below my capacity

96. What is your general opinion about the usefulness of most of your premedical college work in preparing you for medical school?
    - A. Very useful
    - B. Generally useful
    - C. Somewhat useful
    - D. Somewhat useless
    - E. Generally useless

97. How many years of college training did you have prior to enterning medical school?
    - A. 2
    - B. 3
    - C. 4
    - D. 5
    - E. 6 or more

98. When allowed to take elective (nonrequired courses in premedical school) which of the following did you tend to select?
    - A. Courses indirectly or directly related to my required premedical courses
    - B. Courses which would fill my academic weak points
    - C. Courses which would give me a good, rounded, liberal education
    - D. Courses related to a nonmedical interest or hobby of mine
    - E. Easy courses, regardless of their practical or academic value
    - F. Other (specify)______________

99. How would you describe your general enthusiasm toward your studies as a premedical student?
    - A. Very enthusiastic
    - B. Rather enthusiastic
    - C. Somewhat enthusiastic
    - D. Indifferent
    - E. Disinterested
    - F. Other (specify)______________

100. What was your premedical grade-point average in all your science courses?
    - A. A minus or better
    - B. B plus
    - C. B
    - D. B minus
    - E. C plus or lower

Instructions for questions 101 to 112: Indicate how well you succeeded in each of the subjects listed below during your premedical college training. Circle the appropriate letter for each subject.

	Never had the subject (A)	Poor (B)	Fairly well (C)	Very well (D)	Exceptionally well (E)
101. Biological sciences.	A	B	C	D	E
102. Mathematics......	A	B	C	D	E
103. Physical sciences..	A	B	C	D	E
104. Social sciences....	A	B	C	D	E
105. Physics............	A	B	C	D	E
106. Chemistry.........	A	B	C	D	E
107. Art...............	A	B	C	D	E
108. Dramatics.........	A	B	C	D	E
109. Economics.........	A	B	C	D	E
110. Engineering.......	A	B	C	D	E
111. English...........	A	B	C	D	E
112. Foreign languages..	A	B	C	D	E

113. How specialized was your training during your premedical years of college?
    - A. Very specialized
    - B. Somewhat specialized
    - C. Equally specialized and liberal
    - D. Somewhat liberal
    - E. Very liberal

114. During your premedical training, how many years were you supported (either wholly or in part) by scholarships?
    - A. 0
    - B. 1
    - C. 2
    - D. 3
    - E. 4

115. Which of the following best describes your marital situation when you entered medical school?
   - A. Married with one or more children
   - B. Married, but had no children
   - C. Single, planning to get married, and married during medical school
   - D. Single, planning to get married, but didn't marry during medical school
   - E. Single and not pl[illegible]ng to get married
   - F. Other (specify)________________

116. About what per cent of your total expenses did you earn during both premedical and medical school?
   - A. 90-100%
   - B. 60-90%
   - C. 30-60%
   - D. 10-30%
   - E. Under 10%

117. How often during medical school did you study with other medical students?
   - A. Very frequently
   - B. Frequently
   - C. Sometimes
   - D. Seldom
   - E. Never

118. How did your grade-point-average for your first year of college compare with your grade-point-average for your last year of premedical school?
   - A. They were both high
   - B. They were about the same and above average
   - C. They were about the same and about average
   - D. First year grade-point-average was comparatively higher than last year grade-point-average
   - E. Last year average was comparatively higher than first year

119. When did you first seriously consider going into medicine as a career?
   - A. During elementary school or before
   - B. During junior high school or early high school
   - C. During the last two years of high school
   - D. During my first year of college
   - E. After my first year of college
   - F. Other (specify)________________

120. How many times did you change your college major before entering medical school?
   - A. Never: it was always medicine
   - B. Once
   - C. Twice
   - D. Three times
   - E. Four or more times

121. When you were about 18 to 20 years old, and you met people for the first time in a social setting, how often did you feel that they did not accept you as well as they accepted most other people?
   - A. Quite frequently
   - B. Frequently
   - C. Occasionally
   - D. Rarely
   - E. Never

122. How frequently were your total talents thoroughly utilized and made evident during premedical school?
   - A. Very frequently
   - B. Frequently
   - C. Occasionally
   - D. Rarely
   - E. Never

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Instructions for questions 123 to 136: Indicate the number of times you accomplished each of the achievements listed below before the age of 22 years. Circle the appropriate letter for each achievement.

	Never (A)	Once (B)	Two to five times (C)	Six to ten times (D)	More than ten times (E)
123. Gave an original paper at a scientific or professional meeting........	A	B	C	D	E
124. Won a prize or award in a scientific talent search................	A	B	C	D	E
125. Invented a device that you thought could be patented...............	A	B	C	D	E
126. Had a scientific paper published in a science journal...............	A	B	C	D	E
127. Won or placed in a speech contest........	A	B	C	D	E
128. Had a poem, story, or article published in a public newspaper, a magazine, or in a state or national historical society................	A	B	C	D	E
129. Had a lead in high school or church-sponsored play.	A	B	C	D	E
130. Won a literary award or prize for creative writing.	A	B	C	D	E
131. Had a cartoon published in a school or public newspaper or magazine......	A	B	C	D	E
132. Did experimental photography............	A	B	C	D	E
133. Wrote an interpretive report about another field or study (outside of school or work)................	A	B	C	D	E
134. Entered an artistic competition or contest of any kind (sculpture, ceramic, painting, etc.)..........	A	B	C	D	E
135. Participated in a student movement to change institutional rules, procedures, or policies..............	A	B	C	D	E
136. Built a piece of scientific equipment of your own invention as part of a hobby..................	A	B	C	D	E

Instructions for questions 137 to 138: Indicate the number of times you accomplished each of the achievements listed below before the age of 22 years. Circle the appropriate letter for each achievement.

	Never (A)	Once (B)	Two to five times (C)	Six to ten times (D)	More than ten times (E)
137. Had a poem, story, or article published in a school paper	A	B	C	D	E
138. Won a prize or award in an art competition (sculpture, ceramic, painting, etc.)	A	B	C	D	E

139. How often did you engage in informal group discussions during your premedical school years?
    - A. Very frequently
    - B. Frequently
    - C. Sometimes
    - D. Seldom
    - E. Never

140. During your premedical school, how often did you visit the library to read materials not directly related to your classwork?
    - A. Very frequently
    - B. Frequently
    - C. Occasionally
    - D. Rarely
    - E. Never

141. What was your approximate premedical school grade-point-average in your non-science courses?
    - A. A minus or better
    - B. B plus
    - C. B
    - D. B minus
    - E. C plus or lower

142. What was your overall premedical school grade-point-average?
    - A. A minus or better
    - B. B plus
    - C. B
    - D. B minus
    - E. C plus or below

143. How often did you go after good grades during premedical school?
    - A. Very frequently
    - B. Frequently
    - C. Occasionally
    - D. Rarely
    - E. Never

144. How would you classify your ability to concentrate during premedical school?
    - A. Extremely able
    - B. Quite able
    - C. Somewhat able
    - D. Rarely able
    - E. Hardly able

145. About what percentage of your classmates did you surpass academically during your last year of premedical school?
   - A. Over 90%
   - B. 90%
   - C. 80%
   - D. 50%
   - E. Under 50%
   - F. (Don't know)

146. In studying books both now and when you were in college how often have you written your own comments, notes, etc., in the margins of the book?
   - A. Very frequently
   - B. Frequently
   - C. Occasionally
   - D. Rarely
   - E. Never

147. How would you classify your best friend in your last year of premedical school in terms of his interests?
   - A. Strong social interests, but limited academic interests
   - B. Emphasized social activity, but had fairly strong academic interests
   - C. About equal academic and social interests
   - D. Emphasized academic interests but somewhat active socially
   - E. Strong academic interests, with a limited amount of social activity

148. How often did you have periods of doubt, depression, uncertainty, etc., during your college career?
   - A. Very frequently
   - B. Frequently
   - C. Sometimes
   - D. Seldom
   - E. Never

149. When you were about 18 to 20 years old, how important was it to you to be well accepted in a social group?
   - A. Of utmost importance
   - B. Very important
   - C. Somewhat important
   - D. Not so important
   - E. Not important at all

150. Which one of the following best describes your medical education?
   - A. I went straight through medical school without any interruptions
   - B. I had to drop out of medical school at least once because of ill health
   - C. I had to drop out of medical school at least once because of financial difficulties
   - D. I had to drop out of medical school at least once because of church wor
   - E. I had to drop out of medical school at least once because of family obligations
   - F. Other (specify)______________

151. Which one of the following best describes your medical education?
   - A. I went straight through medical school without any interruptions
   - B. I had to drop out of medical school for 6 months or less
   - C. I had to drop out of medical school for 6 months to one year
   - D. I had to drop out of medical school for one to two years
   - E. I had to drop out of medical school for more than two years

152. Which one of the following best describes how you think your collegemates remember you?
   - A. A good fellow
   - B. A serious student
   - C. A campus leader
   - D. An athlete
   - E. An undistinguished student

Instructions for questions 153 to 159: Indicate to what degree each of the items below had an effect on your academic performance during medical school. Circle the appropriate letter for each item.

	A definite, positive effect (A)	A slight, positive effect (B)	No effect (C)	A slight, detrimental effect (D)	A definite, detrimental effect (E)
153. Extracurricular campus activities...	A	B	C	D	E
154. Financial problems..	A	B	C	D	E
155. Marriage and family responsibilities.....	A	B	C	D	E
156. Emotional problems..	A	B	C	D	E
157. Immaturity...........	A	B	C	D	E
158. Non-medical scholastic interests............	A	B	C	D	E
159. Not knowing what you really wanted to do.................	A	B	C	D	E

160. Which of the following types of medical school instruction did you obtain most benefit from?
   - A. Classes in which the teacher lectured, we took notes, read a text, and took tests to determine our grade
   - B. Classes in which the teacher lectured most of the time, students presented occasional short papers, and there was some discussion by the students
   - C. Classes in which the students presented papers, there was frequent discussion by the students, and some, but not much direction from the teacher
   - D. Clinics; classes in which a small group of students accompanied the instructor during rounds
   - E. Independent study in which you worked on your own and occasionally saw your instructor for advice and direction

161. Which of the following hypothetical happenings would have pleased you most as a medical student?
   - A. Winning a highly competitive school prize
   - B. A high grade in a difficult course or class
   - C. Acquisition of a new skill
   - D. Establishing a new, congenial friendship with a fellow student
   - E. Learning a faculty member had received a Nobel Prize

162. Which of the following groups of medical practice most interested you when you entered medical school?
   - A. Internal medicine or general practice
   - B. Surgery
   - C. Psychiatry
   - D. Pathology, obstetrics or gynecology
   - E. Radiology, dermatology, or preventive medicine

Adult Life

163. To what extent have you fulfilled the general standards of achievement expected of you by your parents?
A. Surpassed their expectations
B. Fulfilled their expectations
C. Still expect to fulfill their expectations
D. Only partially met their expectations
E. Have not met their expectations

164. How would you regard yourself with respect to your overall achievements as of today?
A. Very successful
B. Moderately successful
C. Neither successful nor unsuccessful
D. Somewhat unsuccessful
E. Unsuccessful

165. To what extent do you prefer working alone (as compared to working with an associate)?
A. To a very great extent
B. To a great extent
C. To some extent
D. To a small extent
E. To a very small extent

166. Which one of the following best describes your usual reaction to being served bad food in a restaurant?
A. I always complain to the waiter or manager
B. I usually complain to the waiter or manager
C. I sometimes complain to the waiter or manager
D. I seldom complain to the waiter or manager
E. I rarely complain to the waiter or manager

167. Which of the following best describes how comfortable you feel in social situations?
A. Very comfortable
B. Somewhat comfortable
C. Indifferent
D. Somewhat uncomfortable
E. Very uncomfortable

168. Which one of the following best describes your attitude towards life?
A. Very conservative
B. Conservative
C. Middle of-the-roader
D. Liberal
E. Very liberal

169. To what extent have you found books more interesting than people?
A. To a great extent
B. To some extent
C. To a small extent
D. To a very small extent
E. Not at all

170 My ability to make unhappy or saddened people feel better has been:
A. Excellent
B. Good
C. Fair
D. Poor
E. Not good because I have not tried

171. How much do you enjoy conversation with rather ordinary conventional people?
A. Very much
B. A lot
C. Some
D. Very little
E. Not at all

172. How do you feel about talking to people you don't know?
    A. I almost always find it enjoyable
    B. I usually find it enjoyable
    C. I usually find it neither enjoyable nor unpleasant
    D. I usually find it rather unpleasant
    E. I almost always find it unpleasant

173. Which one of the following best describes your personality?
    A. Intellectual
    B. Cultured
    C. Quiet
    D. Awkward
    E. Boorish

174. How often do you communicate or exchange information with people on topics outside your own field?
    A. Very frequently
    B. Frequently
    C. Sometimes
    D. Seldom
    E. Never

175. How often do you have a craving for excitement?
    A. Quite frequently
    B. Frequently
    C. Occasionally
    D. Rarely
    E. Never

176. How frequently are you troubled by useless stray thoughts running through your mind?
    A. Very frequently
    B. Frequently
    C. Occasionally
    D. Rarely
    E. Never

177. How observant are you of other people (noticing mannerisms, particular idioms, etc.)?
    A. Exceedingly observant
    B. Very observant
    C. Somewhat observant
    D. Not very observant
    E. Not at all

178. How often do you seek a new environment or change (mountain scenery, room in a strange city, etc.) where you can relax and think out problems?
    A. Very frequently
    B. Frequently
    C. Occasionally
    D. Rarely
    E. Never

179. Which one of the following best describes your personality?
    A. Good-natured
    B. Cooperative
    C. Idealistic
    D. Critical
    E. Friendly

180. To what extent do you tend to forget trivial things such as names of streets, small towns, obscure historical facts, and telephone numbers?
    A. To a very great extent
    B. To a great extent
    C. To some extent
    D. To a small extent
    E. Not at all

181. Which of the following adages do you think has been most significant in your life?
    A. "To thine own self be true"
    B. "Do unto others..."
    C. "Seek self-fulfillment"
    D. "Enjoy life to its fullest"
    E. "Know yourself"

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182. How often do you have a desire to be alone, to pursue your own thoughts and interests?
   A. Very frequently
   B. Often
   C. Sometimes
   D. Seldom
   E. Never

183. How often are you inclined to analyze the motives of others?
   A. Very frequently
   B. Frequently
   C. Sometimes
   D. Seldom
   E. Never

184. Which one of the following attitudes of people toward you do you value most?
   A. Admiration
   B. Respect
   C. Confidence
   D. Gratitude
   E. Warm friendliness

185. If one of the things listed below would happen tomorrow, which one of them would give you the greatest sense of satisfaction and pleasure?
   A. Your election to a high office in an elite scientific or professional organization
   B. Election of your son to the presidency of his school class
   C. An unexpected windfall of a substantial amount of money
   D. Learning that your favorite charity has received a very large donation
   E. A sudden lessening of dangerous international tensions

186. Which one of the following best describes your personality?
   A. Domineering
   B. Agressive
   C. Intellectual
   D. Patient
   E. Energetic

187. How accurately do all of the following set of characteristics describe you: deeply interested in intellectual problems, emotionally stable, deeply interested in people, friendly, pleasing personality, and extremely patient?
   A. Very accurate
   B. Fairly accurate
   C. Not too accurate
   D. Quite inaccurate
   E. Very inaccurate

188. Which one of the following best describes yourself?
   A. Deeply interested in intellectual problems
   B. Emotionally stable
   C. Deeply interested in people
   D. Friendly
   E. Extremely patient

189. Which one of the following occupations would you most like to go into for a career?
   A. Farmer
   B. Purchasing agent
   C. Lawyer
   D. Math-science teacher
   E. Journalism

190. How often do you evaluate and try to modify your own system of thoughts and ideas?
   A. Very frequently
   B. Often
   C. Sometimes
   D. Seldom
   E. Never

191. How persistent are you in gaining recognition of your ideas?
   A. Extremely persistent
   B. Very persistent
   C. Somewhat persistent
   D. Not very persistent
   E. Not at all persistent

192. How sensitive are you to criticism of your work?
    A. I cannot tolerate it
    B. Very sensitive
    C. Somewhat sensitive
    D. Not very sensitive
    E. Not at all sensitive

193. If the following headlines appeared in equal size in your newspaper, which would you read first:
    A. "Great Improvement in Market Conditions"
    B. "Protestant Leaders to Consult on Reconciliation"
    C. "Two Man Capsule Orbits Earth"
    D. "President Gets Farm Bill through House"
    E. "Actress Commits Suicide"

194. Which of the following is most satisfying to you?
    A. Being a leader
    B. Doing interesting work
    C. Contributing to society
    D. Having independence
    E. Achieving recognition

195. My general ability to deal effectively with angry, sullen, or hostile people has been:
    A. Extremely adequate
    B. Very adequate
    C. Somewhat adequate
    D. Not very adequate
    E. Completely inadequate

196. Which one of the following occupations would you most like to pursue for your career?
    A. Chemist
    B. Salesman
    C. Banker
    D. Psychologist
    E. Lawyer

197. How would you describe yourself on dominance in your relationships with other persons?
    A. Much more dominant than average
    B. Somewhat more dominant than average
    C. About average in dominance
    D. Somewhat less dominant than average
    E. Much less dominant than average

198. How frequently do you worry about being successful in life?
    A. Very frequently
    B. Frequently
    C. Sometimes
    D. Seldom
    E. Never

199. How did you react to your active military service?
    A. Exceptionally well
    B. Well
    C. Fairly well
    D. Not very well
    E. Does not apply

200. Which one of the following statements best describes what you feel we should do to a formidable militaristic power that actually threatens the U.S.A.?
    A. We should attack and destroy it
    B. We should attack but not destroy it
    C. We should show it our strenght to prevent an attack
    D. We should keep all diplomatic channels open and attempt a conciliation
    E. We should yield to its demands

201. Which one of the following best describes your personality?
    A. Hard
    B. Cynical
    C. Stern
    D. Practical
    E. Soft-hearted

202. What do you think is the relationship between creativity and mental health?
   A. Definite relationship, the more creative are the more mentally healthy
   B. Somewhat positive relationship
   C. Little if any relationship
   D. Somewhat negative relationship
   E. Strong negative relationship; the more creative are less mentally healthy
   F. Other (specify)________________

203. To what extent do you consider yourself a nervous person?
   A. Definitely more nervous than average
   B. Somewhat more nervous than average
   C. About average in nervousness
   D. Somewhat less nervous than average
   E. Definitely less nervous than average

204. Which one of the following statements do you feel would help best in running our daily lives?
   A. We should let our emotions guide us
   B. We should depend more on our emotions and less on logical reasoning
   C. We should depend on both our emotions and logical reasoning
   D. We should depend less on our emotions and more on logical reasoning
   E. We should let logical reasoning guide us

205. If you were to feel miserable and blue what would you least prefer to do?
   A. Have a few drinks
   B. Be by myself
   C. Be with friends
   D. Talk to someone
   E. Try to sleep it off

206. If you were to feel miserable and blue what would you most prefer to do?
   A. Go to the movies
   B. Have a few drinks
   C. Talk to someone
   D. Be by myself
   E. Try to sleep it off
   F. Other (specify)______________

207. How much do you like mechanical work?
   A. A great deal
   B. Some
   C. Little
   D. Very little
   E. Not at all

208. Which one of the following do you find most stimulating to you?
   A. People
   B. Science
   C. Theories
   D. Music
   E. Nature

Professional Life

209. How do you view the task of writing medical reports (other than routine office reports)?
   A. Extremely difficult for me
   B. Very difficult for me
   C. Somewhat difficult for me
   D. Rarely difficult for me
   E. Never difficult for me

210. To how many professional organizations do you now belong?
   A. None
   B. 1
   C. 2
   D. 3
   E. 4 or more

211. Which of the following best describes your approach to a new medical problem on which you expect to be working intensively over a long period of time?
   - A. Plunge in by reading the latest articles and most comprehensive work that has been done so far in the area
   - B. Read older literature or that which is related in somewhat of a peripheral way
   - C. Think the area out and then discuss it with some associates
   - D. Write out your own expectations, hunches, procedures, etc., before you start reading pertinent or related literature
   - E. None of the above

212. Which one of the following statements is most important to you?
   - A. I want my parents never to be lacking the necessities of comfortable living
   - B. I want to be able to insure for my children the best education that they could possibly have
   - C. I want to have my parents' advice, and to heed their wishes in planning my affairs
   - D. I want to get my wife the clothes she likes and to save her from household drudgeries
   - E. I want to see organized religion maintain or increase its influence

213. To what extent has your practice had an effect on your hobbies or interest in other activities, i.e., has it interfered or influenced your interests and hobbies?
   - A. A great deal
   - B. Quite a bit
   - C. Some
   - D. A little
   - E. None

214. How willing are you to accept new or apparently novel approaches to the solution of medical problems?
   - A. Very willing
   - B. Somewhat willing
   - C. Somewhat unwilling
   - D. Very unwilling
   - E. Use only conventional approaches

215. Which one of the following best describes your usual role in social situations?
   - A. I keep in the background
   - B. I get acquainted with only one or two people
   - C. I get acquainted with a few people
   - D. I get acquainted with everybody
   - E. I'm the "life of the party"

216. Rate your ability to grasp ideas and use them in rational thinking with explicit clarity and fulness. Compare yourself with your associates.
   - A. Excellent
   - B. Very good
   - C. Good
   - D. Poor
   - E. No ability

217. Rate your ability, as compared with your colleagues, to determine your own thoughts and actions, especially in medical work, upon the basis of your own perception and judgments. Consider your power on thinking and acting, to set a course of behavior and to move toward a goal without the prompting pressure, guidance, or authorization of any mind but your own.
   - A. Far below my colleagues
   - B. Somewhat below my colleagues
   - C. Comparable to my colleagues
   - D. Somewhat above my colleagues
   - E. Outstanding

218. How frequently do you carefully plan out your work before you begin it?
   A. Always
   B. Very frequently
   C. Frequently
   D. Sometimes
   E. Seldom or never

219. How often have you omitted information that is not cheerful and could have had psychological effects when revealing a diagnosis to a patient?
   A. Very frequently
   B. Frequently
   C. Sometimes
   D. Seldom
   E. Never

220. Which of the following best describes you?
   A. I greatly influence my associates in their opinions
   B. I influence my associates somewhat in their opinions
   C. Sometimes I influence my associates; sometimes I don't
   D. I don't influence my associates much, but I have definite opinions
   E. I don't influence my associates at all

221. How much opportunity have you had in your present practice to demonstrate all of your capabilities?
   A. I have no opportunity to demonstrate my capabilities
   B. I have very little opportunity to demonstrate my capabilities
   C. I can only partially demonstrate my capabilities
   D. I can demonstrate most of my capabilities
   E. I can demonstrate all of my capabilities

222. Which one of the following best describes your usual reaction to being criticized by your colleagues?
   A. My feelings are always hurt
   B. My feelings are usually hurt
   C. My feelings are occasionally hurt
   D. My feelings are seldom hurt
   E. My feelings are rarely hurt

223. Which phrase best describes the way you feel when you discuss your accomplishments in medicine with your associates?
   A. I feel highly gratified
   B. I feel gratified
   C. I feel satisfied and interested
   D. I feel somewhat uncomfortable
   E. I don't usually discuss my medical accomplishments with my associates

224. How independent are you in thought and action, especially in your medical work?
   A. Exceedingly independent
   B. Very independent
   C. Somewhat independent
   D. Rarely independent
   E. Not at all

225. To what extent do you weigh and ponder various courses of action before making a decision?
   A. To a very great extent
   B. To a great extent
   C. To some extent
   D. To a small extent
   E. Not at all

226. How well informed are you in other fields of medicine aside from your own area?
   A. Exceedingly well informed
   B. Well informed
   C. Farily well informed
   D. Poorly informed
   E. Not informed

227. Which one of the following best describes how you usually feel about being late for an appointment with one of your professional colleagues?
  - A. It bothers me a great deal
  - B. It bothers me somewhat
  - C. It seldom bothers me
  - D. It doesn't bother me at all
  - E. I enjoy being late

228. How do you feel about giving a speech before a large group of your professional associates?
  - A. I could not be forced to make such a talk
  - B. I would do it but would dislike it very much
  - C. I would do it but would dislike it
  - D. I wouldn't object too much
  - E. I like to make such talks
  - F. Other (specify)__________________

229. How often do you tend to think of some "wild ideas" during a discussion with your associates?
  - A. Very frequently
  - B. Frequently
  - C. Occasionally
  - D. Rarely
  - E. Never

230. Rate your ability, compared with your associates, to think intuitively, that is to sense problems and solutions prior to comprehending them.
  - A. Excellent
  - B. Very good
  - C. Good
  - D. Poor
  - E. No ability

231. Rate your ability, as compared with your associates, to change your ideas and behavior and to tolerate changes around you. This involves the ability to be able to see things in various frames of reference, and to move from one perspective of thought to another.
  - A. Excellent
  - B. Very good
  - C. Good
  - D. Poor
  - E. No ability

232. Rate your ability, compared with your associates, to sense and grasp significance in things, without explicit comprehension of them.
  - A. Excellent
  - B. Very good
  - C. Good
  - D. Poor
  - E. No ability

233. If you had your choice of an ideal occupation, how much association would you like to have with other people?
  - A. A very great deal
  - B. One that would generally require working with a large number of people
  - C. One that would generally allow close work with a small number of people
  - D. One that would generally allow close work with one other person
  - E. One that would generally allow me to work alone

234. To what extent are you an individual who becomes so absorbed in his own work and interests that he does not mind a lack of friends?
  - A. To a very great extent
  - B. To a great extent
  - C. To some extent
  - D. To a small extent
  - E. Not at all

235. How would you rate yourself in perseverance, i.e., in tendency to persist in an endeavor in spite of difficulties and distractions?
   - A. Well above average
   - B. Above average
   - C. Average
   - D. Slightly below average
   - E. Well below average

236. To what extent has your practice had an effect on your social activities, i.e., has it interfered or influenced other facets of your social life?
   - A. To a very great extent
   - B. To a great extent
   - C. To some extent
   - D. To a small extent
   - E. Not at all

237. Which of the following best describes how frequently you are dissatisfied with your own progress in the medical profession?
   - A. I am frequently dissatisfied
   - B. Often
   - C. Occasionally
   - D. Rarely
   - E. Hardly ever

238. Which of the following had the greatest influence on you in determining your choice of the medical profession?
   - A. Possibility of high renumeration
   - B. Value of the area to society
   - C. A particular interest in the field
   - D. Natural aptitudes or tendencies
   - E. The future security involved
   - F. Other (specify)________________

239. How often do you now engage in informal group discussions?
   - A. Very frequently
   - B. Frequently
   - C. Sometimes
   - D. Seldom
   - E. Never

240. What level of original work do you want to produce at least once in your field in order to satisfy your minimum professional goals?
   - A. Little or none
   - B. A noticeable level
   - C. A moderately high level
   - D. A high level
   - E. A very high level

241. What is the least theoretical contribution in your medical field or specialty which would satisfy you?
   - A. An original and profound theoretical contribution
   - B. A large overall theoretical contribution
   - C. A moderate theoretical contribution
   - D. A small theoretical contribution
   - E. Little or no theoretical contribution

242. What is the minimum quantity of publications, research, or medical reports, etc., with which you would be satisfied during your professional career?
   - A. I expect to publish rarely
   - B. I expect to publish at least occasionally
   - C. I expect to publish a moderate amount
   - D. I expect to publish a great deal
   - E. I expect to publish extensively

243. Since completion of your residency, how much actual opportunity have you had to do creative work?
   - A. Very great opportunity
   - B. Great opportunity
   - C. Some opportunity
   - D. Little opportunity
   - E. Not at all

Instructions for questions 244 to 258: Rate yourself on each of the traits listed below by estimating how you see yourself at the present time. In each case, compare yourself with typical physicians you have known. Circle the appropriate letter for each trait.

	Among top 2% (A)	Among top 10% (B)	Above average (C)	Average (D)	Below average (E)
244. Emotional stability.....	A	B	C	D	E
245. Originality.............	A	B	C	D	E
246. Leadership............	A	B	C	D	E
247. Popularity.............	A	B	C	D	E
248. Dependability..........	A	B	C	D	E
249. Drive to achieve.......	A	B	C	D	E
250. Sociability............	A	B	C	D	E
251. Aggressiveness.......	A	B	C	D	E
252. Self-control...........	A	B	C	D	E
253. Independence..........	A	B	C	D	E
254. Conservatism.........	A	B	C	D	E
255. Self-confidence........	A	B	C	D	E
256. Self-understanding....	A	B	C	D	E
257. Perseverance.........	A	B	C	D	E
258. Intuition or insight.....	A	B	C	D	E

259. Rate your drive, as compared with your colleagues, on the dynamic force of yourself, as expressed in your work. Consider the energy with which you conduct your medical practice, the speed of your accomplishment, and the amount of work you get done.

A. A very great drive
B. Great drive
C. Some drive
D. Small drive
E. Little or none

260. Which one of the following best describes your usual reaction to exciting situations?

A. I always get over-excited
B. I usually get over-excited
C. I usually get excited, but not over-excited
D. I seldom get excited
E. I rarely get excited

261. To what extent do you feel that hard work is the basic factor of success?

A. To a great extent
B. To some extent
C. To a small extent
D. To a very small extent
E. Not at all

262. Which one of the following would you generally believe to be most helpful to you in solving difficult medical problems?

A. Handbooks and journal articles
B. Discussion with associates
C. Reflective thought
D. Discussion with persons from other fields
E. Communicating with authorities in the field
F. Other (specify)________________

263. How would you describe yourself in creativeness as compared to your associates?

A. Much more creative than most of my associates
B. More creative than average
C. Slightly more creative than average
D. About average
E. Less creative than average

264. How persistent or aggressive are you in gaining recognition of your ideas?

A. Very great persistence
B. Very persistent
C. Quite persistent
D. Somewhat persistent
E. I'm not very persistent

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265. Rate your drive as expressed in your work. Think of the energy you exert in conducting your work activities. Consider the speed with which you work and the amount of work you get done.

Somewhat less than most physicians	About the same as most physicians	Somewhat more than most physicians	Considerably more than most physicians	Far more than most physicians
(A)	(B)	(C)	(D)	(E)

266. Rate your tendency to uphold the standards of medicine, your field, or specialty. Consider your willingness to report findings honestly and to weigh evidence objectively in evaluating illnesses, problems, and medical concepts--no matter how closely you yourself are involved.

Somewhat less than most physicians	About the same as most physicians	Somewhat more than most physicians	Considerably more than most physicians	Far more than most physicians
(A)	(B)	(C)	(D)	(E)

267. Rate your ability to grasp ideas or concepts and to use them effectively in solving your medical problems. Consider how well and how quickly you grasp the essentials of a problem, see alternative solutions, and select the most logical, rational, and appropriate solution.

Somewhat less than most physicians	About the same as most physicians	Somewhat more than most physicians	Considerably more than most physicians	Far more than most physicians
(A)	(B)	(C)	(D)	(E)

268. Rate your ability to inform other people, especially about the things you are proficient in. Think of your ability to present old and new ideas to others, to explain and illustrate complexities in a clear, orderly way, and your readiness and skill in adapting your materials, demonstrations, and explanations to the needs of others. Consider your ability to hold their attention while presenting pertinent ideas.

Somewhat less than most physicians	About the same as most physicians	Somewhat more than most physicians	Considerably more than most physicians	Far more than most physicians
(A)	(B)	(C)	(D)	(E)

269. Rate your ability to change your ideas and behavior and to tolerate changes around you. Consider your tendency to see things from various viewpoints, to move from one framework of thought to another, to shift from one problem to another in a comfortable manner. Consider your ability to spread your attention broadly and to focus it narrowly, as occasions arise.

Somewhat less than most physicians	About the same as most physicians	Somewhat more than most physicians	Considerably more than most physicians	Far more than most physicians
(A)	(B)	(C)	(D)	(E)

270. Rate your ability to stay with a problem persistently. Consider your powers of sustained applications, your ability to work hard over a long period of time, to thoroughly diagnose ailments or problems, to stay with a given treatment until resolved, and never to give up unless it is clearly best to do so.

Somewhat less than most physicians	About the same as most physicians	Somewhat more than most physicians	Considerably more than most physicians	Far more than most physicians
(A)	(B)	(C)	(D)	(E)

271. Rate your ability to determine your own thought and action based on your own ideas, judgements, and goals. Consider your power in thinking and acting to set a course of action and to move toward a goal without the prompting, pressure, guidance, or authority from anyone but yourself.

Somewhat less than most physicians	About the same as most physicians	Somewhat more than most physicians	Considerably more than most physicians	Far more than most physicians
(A)	(B)	(C)	(D)	(E)

272. Rate your power to discern value or the absence of value in things, facts, situations, ideas, intellectual relationships, problems, treatments, etc., for medical or research purposes of any kind. Consider your ability to discriminate between the relevant and the irrelevant, between the essential and accidental, between the fruitful and the barren. Consider your appreciation of what is needed and not needed, what is practical or impractical and what is primary or secondary in your work.

Somewhat less than most physicians	About the same as most physicians	Somewhat more than most physicians	Considerably more than most physicians	Far more than most physicians
(A)	(B)	(C)	(D)	(E)

273. Rate your capacity to make use of all facilities and means, obvious or not, which are potentially available for the performance of your work and learning in medicine. Consider your resourcefulness in obtaining the material, facilities, opportunities, etc., for the furtherance of your work?

Somewhat less than most physicians	About the same as most physicians	Somewhat more than most physicians	Considerably more than most physicians	Far more than most physicians
(A)	(B)	(C)	(D)	(E)

274. Rate your desire to store up and possess the known facts in medicine in your specialty, or in your field. Consider the amount of detail of factual matter you try to collect about any medical subject on which you focus your attention and the degree to which you find this gathering of facts a satisfaction or virtue.

Somewhat less than most physicians	About the same as most physicians	Somewhat more than most physicians	Considerably more than most physicians	Far more than most physicians
(A)	(B)	(C)	(D)	(E)

275. Rate your desire to gain all of the available insights in your field or specialty through discovery or invention. Consider your willingness to tolerate difficulties, discomforts, or disadvantages and to do hard, exacting work in order to contribute new knowledge to medical science. Think of the intensity of your desire to achieve new insights for their own sake and the degree to which you gain satisfaction from searching for such insights.

Somewhat less than most physicians	About the same as most physicians	Somewhat more than most physicians	Considerably more than most physicians	Far more than most physicians
(A)	(B)	(C)	(D)	(E)

276. Rate your ability to sense and grasp the significance of problems, thoughts, etc., without being fully aware of it or before you could explain it--that is, intuitively. Consider your power and tendency to find meaning in facts, relationships, and ideas through a feeling which is inside yourself before you can explain why you sense that you know the meaning.

Somewhat less than most physicians	About the same as most physicians	Somewhat more than most physicians	Considerably more than most physicians	Far more than most physicians
(A)	(B)	(C)	(D)	(E)

277. Rate your ability to function effectively with your colleagues in a working situation. Consider how well you sense the needs of others, your understanding of others, your ease in dealing with people, and your power to promote group activity and solidarity. Think of your willingness to share your knowledge, to recognize the efforts and achievements of others, and to defend your professional group and protect its legitimate interests.

Somewhat less than most physicians	About the same as most physicians	Somewhat more than most physicians	Considerably more than most physicians	Far more than most physicians
(A)	(B)	(C)	(D)	(E)

278. Rate your ability to initiate and guide the activities of your mind beyond the already known areas of understanding. Judge your power to go through three stages: first to have an inward feeling of a need to reorganize thinking or knowledge in a given area of medicine which you cannot yet describe. Secondly, to pay attention to that inward feeling, to develop it through observation, study, or thinking. Thirdly, to express that feeling by forming a reorganization of the area into a new shape, form, or conceptualization. Consider, in short, your power to create a new insight in medicine or basic science.

Somewhat less than most physicians	About the same as most physicians	Somewhat more than most physicians	Considerably more than most physicians	Far more than most physicians
(A)	(B)	(C)	(D)	(E)

279. Rate your desire to adapt yourself to the needs and wishes of others. Consider to what degree you put aside your own ideas and feelings in a situation and accept the ideas of other people. Consider your tendency to be cooperative, to smooth over disagreements, and to get a job done with as little friction as possible from other people.

Somewhat less than most physicians	About the same as most physicians	Somewhat more than most physicians	Considerably more than most physicians	Far more than most physicians
(A)	(B)	(C)	(D)	(E)

280. Rate your willingness to work long, irregular hours:
- A. I thoroughly enjoy it
- B. I usually enjoy it
- C. It doesn't bother me
- D. I dislike it, but I tolerate it
- E. I dislike it and avoid it as much as I can

281. Rate how important you feel it is for a physician to establish his practice in a given locality and remain there throughout his professional career:
- A. Of utmost importance
- B. Very important
- C. Somewhat important
- D. Not very important
- E. Not important at all

282. Rate your ability to establish a warm-doctor patient relationship:

Getting along with patients, giving them special attention when they need or request it, establishing rapport with patients, and showing concern for their welfare, displaying sincerely, empathy, and understanding to patients.

- A. I never have any trouble in this area
- B. I rarely have any trouble in this area
- C. I seldom have any trouble in this area
- D. I occasionally have some trouble in this area
- E. I frequently have trouble in this area

283. Rate your professional honesty and integrity:

Being honest with oneself and in dealing with colleagues and patients, realizing your limitations of knowledge and skill, seeking advice and consultations and referring patients when necessary

A. I maintain exceptionally high standards of honesty and integrity
B. I maintain quite high standards of honesty and integrity
C. I maintain high standards of honesty and integrity
D. My standards of honesty and integrity are about the same as most physicians
E. I should improve my standards of honesty and integrity

284. Rate the degree to which you make yourself available to your patients:

Ensuring prompt service to patients by making house calls, allowing after-hour office calls, meeting them at hospitals when necessary, and readily working them into your appointment schedule

A. I go to great efforts to let my patients know that I am always available
B. I am always available, but I don't emphasize this to my patients
C. I am usually available
D. I am usually available, but I discourage late appointments or house calls
E. I generally restirct my practice to regular office hours

285. Rate your diagnostic thoroughness:

Utilizing all the abilities, skills, techniques, and facilities at your disposal to ensure accurate diagnosis and effective treatment of patients

A. Exceeding thorough with all of my patients
B. Exceeding thorough with most of my patients
C. Very thorough with most of my patients
D. Quite thorough with most of my patients
E. Occasionally I should be more thorough

286. Rate your willingness to consult with other physicians on medical problems:

Readily seeking counsel, advice, opinions and even treatment for your patients from your colleagues when your knowledge and skill are felt to be limited or inadequate

A. I'm so cautious that I frequently request consultations when I could handle the problem myself
B. I request some form of consultation on most of my patients
C. I request consultations on many, but not most, of my patients
D. I request consultations when needed but this is not very frequent
E. I should request more consultations than I do

287. Rate the degree to which you keep abreast of your field, specialty, or type of practice:

Utilizing all sources of information in keeping oneself informed of developments in medicine; e.g., scientific and professional journals, professional society meetings, post-graduate and refresher courses, drug detail men, discussions with associates, and any other reliable source for keeping abreast

A. I continually and persistently utilize all available sources and keep very informed
B. I continually and persistently utilize several sources and keep very informed
C. I generally utilize several sources and keep myself quite informed
D. I generally utilize only a few sources but keep myself quite informed
E. I should spend more time than I do to keep abreast

288. Rate your intelligence:

Ability to solve problems, learn new material quickly, utilize training effectively, and benefit from one's experiences

A. Exceptional (Top 2%)
B. Superior (Top 10%)
C. Above average (Top 30%)
D. Average
E. Below average

289. Which of the following best describes your attitude toward the role of formal education and training in medicine:

Superior performance in high quality medical schools and in high quality hospitals during medical school, internship, and residency

A. To be a superior physician, it is imperative that one performs well in high quality education and training institutions

B. To be a superior physician, it is very important that one performs well in high quality education and training institutions

C. To be a superior physician, it is important, but not critical, for one to perform well in high quality education and training institutions

D. To be a superior physician, it is of some value, but certainly not critical, for one to perform well in high quality education and training institutions

E. Superior performance in high quality education and training institutions has little or no bearing on how good a physician will be in actual practice

290. Rate your present occupational satisfaction:

Having a keen interest in your field of medicine and deriving a great deal of personal satisfaction from your work and practice

A. Medicine is my single, most important interest in life

B. Medicine is a major interest in my life

C. I am interested in medicine, but I also have other interests that are just as important

D. I am interested in medicine, but I have at least one other interest that is more important than medicine

E. I merely accept or tolerate medicine and if I had it to do over again I would change to another occuption

291. Rate your drive for self-improvement:

Constantly striving to become a better doctor, continually re-evaluating oneself to improve one's skills and knowledge, trying to do a better job with each patient you treat

A. Exceptional; very few physicians have more than I

B. Considerably more than most physicians

C. Somewhat more than most physicians

D. About the same as most physicians

E. Somewhat less than most physicians

292. Rate the importance of a psychosomatic oreintation in medical practice:

Tendency to accept psychosomatic or psychological factors as a major source of medical problems, willingness to develop one's skills in the diagnosis and treatment of psychological problems or to readily refer patients to persons specializing in the care and treatment of psychological or psychosomatic problems

A. Of utmost importance
B. Very important
C. Somewhat important
D. Not very important; can always refer to a psychiatrist
E. Not important at all

293. Rate how important you feel it is for a physician to specialize in medical practice:

A preference for specialized medicine as opposed to general practice, a willingness to sacrifice additionsl time and effort for education and training in one of the areas of medical specialization, persistently studying and preparing oneself for certification by one of the specialty boards

A. Of utmost importance
B. Very important
C. Somewhat important
D. Not very important
E. Not important at all

294. Rate how important you feel it is for a physician to plan his leisure time:

Deliberagely restricting your practice and professional activities so as to allow ample time for leisure, social, and home activities and taking regularly scheduled, lengthy vactions

A. Of utmost importance
B. Very important
C. Somewhat important
D. Not very important
E. Not important at all

295. Rate how important you feel it is for a physician to engage in medical research:

Actively participating in medical research so as to make valuable and original contributions to medical science

A. Of utmost importance
B. Very important
C. Somewhat important
D. Not very important
E. Not important at all

296. Rate how important you feel it is for a physician to be active in scientific and professional societies:

Attending and contributing to local, state, regional, and national scientific and professional society meetings. Seeking and accepting responsibilities and offices and presenting papers in such meetings

A. Of utmost importance
B. Very important
C. Somewhat important
D. Not very important
E. Not important at all

297. Rate how important you feel it is for a physician to publish in scientific and professional journals:

In medical practice, writing up and publishing interesting, unusual, or "classic" case histories. In medical research, actively publishing your findings as they occur so as to keep the profession informed of your progress and contributions

A. Of utmost importance
B. Very important
C. Somewhat important
D. Not very important
E. Not important at all

298. Rate how important you feel it is for a physician to engage in medical teaching:

Seeking and accepting teaching responsibilities in local medical schools, hospitals, and community health programs

A. Of utmost importance
B. Very important
C. Somewhat important
D. Not very important
E. Not important at all

299. Rate how important you feel it is for a physician to establish and maintain hospital affiliations:

Seeking and accepting a number of responsibilities in local hospitals, accepting responsible positions when asked, and gaining the recognition of hospital staffs

A. Of utmost importance
B. Very important
C. Somewhat important
D. Not very important
E. Not important at all

300. Rate the importance you attach to financial success:

Attaining a relatively high standard of living by earning a considerable income from your profession or by making sound investments

A. Of utmost importance
B. Very important
C. Somewhat important
D. Not very important
E. Not important at all

301. Rate the importance you attach to being able to pay attention to details in medical practice:

Keeping accurate, up-to-date patient records, accepting detail work and dealing with it with patience, accuracy, and perserverance

A. Of utmost importance
B. Very important
C. Somewhat important
D. Not very important
E. Not important at all

302. Rate how important professional recognition is for you:

Being able to establish and maintain congenial interpersonal relationships with your colleagues, being recognized as competent and dependable by your colleagues and gaining their recognition for your achievements

A. Of utmost importance
B. Very important
C. Somewhat important
D. Not very important
E. Not important at all

303. Rate yourself on "unselfish dedication to medicine:"

Being unselfish with your time and efforts, having a sincere desire to serve others, donating your services to the care of charity patients in your office, local hospitals, and local charity institutions

A. Much more than most physicians
B. More than most physicians
C. About the same as most physicians
D. Slightly less than most physicians
E. Considerably less than most physicians

304. Rate the importance you attach to community involvement in being a successful physician: Gaining the respect of your community, taking an active part in civic activities, and trying to make valuable contributions to your community

- A. Of utmost importance
- B. Very important
- C. Somewhat important
- D. Not very important
- E. Not important at all

305. Indicate the lowest level of all-round professional reputation with which you would be satisfied and for which you intend to achieve for your entire professional career. Compare yourself with typical physicians you have known.

- A. Slightly below average
- B. Average of a group of typical physicians
- C. Slightly above average
- D. Considerably above average
- E. Far above average

306. Concerning dominance how forceful, directing, decisive you are in your relations with others, which of the following best indicates the lowest level of achievement with which you would be satisfied and for which you intend to achieve for your entire professional career? Compare yourself with typical physicians you have known.

- A. Slightly below average
- B. Average of a group of typical physicians
- C. Slightly above average
- D. Considerably above average
- E. Far above average

307. Indicate the lowest level of all-round likeability by your associates with which you would be satisfied and for which you intend to achieve for your entire professional career. Compare yourself with typical physicians you have known.

- A. Slightly below average
- B. Average of a group of typical physicians
- C. Slightly above average
- D. Considerably above average
- E. Far above average

308. Indicate the lowest level of achievement in all-round communication ability (ability to have patients and associates understand you clearly when you try to communicate your ideas or thoughts to them) with which you would be satisfied and for which you intend to achieve for your entire professional career. Compare yourself with typical physicians you have known.

- A. Slightly below average
- B. Average of a group of typical physicians
- C. Slightly above average
- D. Considerably above average
- E. Far above average

309. Indicate the lowest level of all-round professional skill with which you would be satisfied and for which you intend to achieve for your entire professional career. Compare yourself with typical physicians you have known.
   - A. Slightly below average
   - B. Average of a group of typical physicians
   - C. Slightly above average
   - D. Considerably above average
   - E. Far above average

310. Indicate the lowest level of all-round sociability (ability to get along with people in social situations) with which you would be satisfied and for which you intend to achieve for your entire professional career. Compare yourself with typical physicians you have known.
   - A. Slightly below average
   - B. Average of a group of typical physicians
   - C. Slightly above average
   - D. Considerably above average
   - E. Far above average

311. Indicate the lowest level of achievement in all-round skill with your hands with which you would be satisfied and for which you intend to achieve for your entire professional career. Compare yourself with typical physicians you have known.
   - A. Slightly below average
   - B. Average of a group of typical physicians
   - C. Slightly above average
   - D. Considerably above average
   - E. Far above average

312. Indicate the lowest level of achievement in all-round speaking ability with which you would be satisfied and for which you intend to achieve for your entire professional career. Compare yourself with typical physicians you have known.
   - A. Slightly below average
   - B. Average of a group of typical physicians
   - C. Slightly above average
   - D. Considerably above average
   - E. Far above average

313. Indicate the lowest level of achievement in all-round reading ability with which you would be satisfied and for which you intend to achieve for your entire professional career. Compare yourself with typical physicians you have known.
   - A. Slightly below average
   - B. Average of a group of typical physicians
   - C. Slightly above average
   - D. Considerably above average
   - E. Far above average

314. Concerning conscientiousness (doing a careful, thorough job at all times), which of the following indicates the lowest level of achievement with which you would be satisfied and for which you intend to achieve for your entire professional career? Compare yourself with typical physicians you have known.
   - A. Slightly below average
   - B. Average of a group of typical physicians
   - C. Slightly above average
   - D. Considerably above average
   - E. Far above average

315. Concerning your sense of humor (funny, carefree, happy-go-lucky), which of the following indicates the lowest level of achievement with which you would be satisfied and for which you intend to achieve for your entire professional career? Compare yourself with typical physicians you have known.
   - A. Slightly below average
   - B. Average of a group of typical physicians
   - C. Slightly above average
   - D. Considerably above average
   - E. Far above average

316. In terms of industriousness (ambition, hard work, etc.), which of the following best indicates the lowest level of achievement with which you would be satisfied and for which you intend to achieve for your entire professional career?
   - A. Slightly below average
   - B. Average of a group of typical physicians
   - C. Slightly above average
   - D. Considerably above average
   - E. Far above average

317. Indicate the lowest level of objectivity (ability to face facts and deal with situations realistically in a matter-of-fact manner) with which you would be satisfied and for which you intend to achieve for your entire professional career. Compare yourself with typical physicians you have known.
   - A. Slightly below average
   - B. Average of a group of typical physicians
   - C. Slightly above average
   - D. Considerably above average
   - E. Far above average

318. Indicate the lowest level of achievement in all-round writing ability with which you would be satisfied and for which you intend to achieve for your entire professional career. Compare yourself with typical physicians you have known.
   - A. Slightly below average
   - B. Average of a group of typical physicians
   - C. Slightly above average
   - D. Considerably above average
   - E. Far above average

319. Indicate the lowest level of your concern for others (warm, friendly, sincere interest in other people) with which you would be satisfied and for which you intend to achieve for your entire professional career. Compare yourself with typical physicians you have known.
   - A. Slightly below average
   - B. Average of a group of typical physicians
   - C. Slightly above average
   - D. Considerably above average
   - E. Far above average

320. Indicate the lowest level of achievement in all-round listening ability with which you would be satisfied and for which you intend to achieve for your entire professional career. Compare yourself with typical physicians you have known.
   - A. Slightly below average
   - B. Average of a group of typical physicians
   - C. Slightly above average
   - D. Considerably above average
   - E. Far above average

Instructions for questions 321 to 341: Indicate how each of the personal traits listed below has developed since you graduated from medical school. Circle the appropriate letter for each trait listed.

	Has increased and declined (A)	Has not changed (B)	Has increased only during the last few years (C)	Has continually and steadily increased (D)	Has declined (E)
321. Ability to learn from experience...........	A	B	C	D	E
322. Ability to learn from books, journals, and lectures.............	A	B	C	D	E
323. Sensitiveness.........	A	B	C	D	E
324. Ability to meet people...............	A	B	C	D	E
325. Ability to get along with people..........	A	B	C	D	E
326. Equanimity; composure, calmness......	A	B	C	D	E
327. Altruism; concern for welfare of others......	A	B	C	D	E
328. Tolerance............	A	B	C	D	E
329. Real interest in medicine...........	A	B	C	D	E
330. Professional ambition..	A	B	C	D	E
331. Ability to work long and hard..............	A	B	C	D	E
332. Idealism.............	A	B	C	D	E
333. Self confidence........	A	B	C	D	E
334. Religious interests....	A	B	C	D	E
335. Cultural interests.....	A	B	C	D	E
336. Ability to communicate.	A	B	C	D	E
337. Sense of civic responsibility.........	A	B	C	D	E
338. Aggressiveness; drive..	A	B	C	D	E
339. Originality; creativity..	A	B	C	D	E
340. Sense and practice of rigid honesty.......	A	B	C	D	E
341. Insight into my own capabilities and limitations...........	A	B	C	D	E

342. Which one of the following most influenced you in going into the type of medicine you now practice?
   - A. Medical school faculty
   - B. Family
   - C. Friends
   - D. Fellow students
   - E. Practicing physicians

343. Which of the following most influenced you in going into the type of medicine you now practice?
   - A. Income
   - B. Prestige
   - C. Working conditions
   - D. Variety
   - E. Finishing training sooner

344. Which one of the following professional skills do you need to improve most?
   - A. Knowledge in my field
   - B. Diagnostic acumen
   - C. Dexterity; skill with one's hands
   - D. Good personal relations
   - E. Administrative and organizational ability

345. Indicate in which one of the following professional skills you have the greatest strength?
   - A. Knowledge in my field
   - B. Diagnostic acumen
   - C. Dexterity; good workmanship
   - D. Good personal relations
   - E. Administrative and organizational ability

346. Which one of the following best describes your usual reaction to difficult problems?
   - A. They annoy me
   - B. They worry and fatigue me
   - C. They challenge and stimulate me
   - D. I find them intriguing
   - E. I avoid them if possible

347. Which one of the following best describes what a "satisfactory income" means to you?
   - A. Enough net income to educate my children and provide my family a comfortable home and cultural advantages
   - B. I try to do a good job and am willing to let the income take care of itself
   - C. The more the income the better
   - D. I deserve all I can get and I intend to get it
   - E. I am so interested in medicine that I don't care about my income

348. Which one of the following best describes why you don't take longer vacations than you do?
   - A. I want the status and luxuries offered by a large income
   - B. I love my work so much that vacations are a secondary consideration
   - C. I am determined to excell professionally
   - D. The demands of my large practice are such that my time is not my own
   - E. Other doctors get by on short vacations, so I do too

349. Which one of the following best describes why you don't take longer vacations than you do?
   - A. I need the income
   - B. My overhead is so large I can't take longer vacations
   - C. I want more security for myself and my family
   - D. I need all I can save for my retirement years
   - E. I would lose out to my competitors if I took longer vacations

350. Which one of the following statements comes closest to describing you?
   - A. No matter how hard I try, I am never fully satisfied with my results
   - B. I do the best I can with each task and let it go at that
   - C. I am just too busy to do everyting perfectly
   - D. The quality of my work compares well with that of my colleagues
   - E. I am a realist, I take shortcuts when I have to, and I get by all right

351. Which one of the following was most influential in leading you to choose to enter the field of medicine?
   - A. Pressure by or expectations of your parents
   - B. The example of someone you admired
   - C. Personal interest in medicine
   - D. Idealistic considerations
   - E. I really don't know

APPENDIX B

Characteristics Contributing to the Successful Practice of Medicine

E. G. Lewis, T. L. Jacobsen,
C. W. Taylor, P. B. Price

As the demand for well-trained physicians increases, limited educational facilities make it extremely important that the applicants accepted for medical school are those who have the greatest chance of succeeding in the field of medicine. Thus, the problem of selection of those applicants most qualified and most likely to succeed is becoming an ever pressing one. Most of the research generated by this consideration has been concerned primarily with predicting success in medical school rather than on-the-job performance. Inherent in this procedure is the questionable assumption that both medical school selection devices and medical school performance are highly related to on-the-job performance. However, in the few studies that have been conducted which tested this assumption the results have been disappointing. Richards, Taylor, & Price, (1962), for example, found (a) grades in the first and second years of medical school had only a slightly positive relationship to quality of intern performance, (b) premedical school grades had almost no relationship, and (c) scores on the Medical College Admission Test had a slightly negative relationship. In another series of studies by Price, Taylor, Richards, & Jacobsen, (1963); Price, Taylor, Richards, & Jacobsen, (1964); Richards, Taylor, Price, & Jacobsen, (1965); Taylor, Price, Richards, & Jacobsen, (1964); Taylor, Price, Richards, & Jacobsen, (in press), in which between 25 and 30 criterion measures of on-the-job performance were developed for a college of medicine faculty, a group of certified specialists, and a group of both urban and rural general practitioners, it was found that academic achievement was not closely related to performance as a practicing physician. In fact, premedical and medical school grades showed only a chance relationship to their numerous performance measures. In view of such findings, and basic to better selection and more satisfactory training of medical students, a clearer knowledge is needed than we now possess of what we are trying to produce--a more defined concept of what is implied by the term "a good or successful physician" (Aagard, 1962; Anderson, 1963; Ausubel, 1962; Murphee, 1961).

Methodology and Results

An expeditious and direct first step in this direction is to survey physicians and discover what characteristics they themselves feel are important in the successful practice of medicine. Accordingly, physicians currently practicing in the state of Utah were asked the following "open-ended" question as part of an hour-long interview which was conducted to gather information for our ongoing major project on measures and predictors of physician performance (Price, Taylor, Richards, & Jacobsen, 1963): "With regard to your field or specialty, what do you consider to be the basic factors of success in this area?" The responses to this question were recorded verbatim and provided the raw data for the present study.

The physician sample studied consisted of 372 doctors currently practicing in the state of Utah. This sample was obtained on a voluntary basis from a population of 830 practicing Utah physicians. Thus, approximately 45 per cent of the total population was included in the sample. These 372 doctors were divided into three groups: 96 Urban General Practitioners (UGP), 107 Rural General Practitioners (RGP), and 169 Certified Specialists (CS). Certification by specialty boards was arbitrarily set as the standard to differentiate Specialists from General Practitioners. The division of General Practitioners into Urban and Rural samples was made on the assumption that the difference between the urban and rural settings could have some influence on the results of the study (Taylor, Price, Richards, & Jacobsen, (in press)). Urban and Rural classifications were assigned depending upon the geographic locality where each physician practiced.

A total of 1106 separate responses to the above question were obtained from the 372 participating physicians. Each conceptually separate response of a physician was recorded on cards and coded according to his identification number and type of practice. The cards were then sorted to determine what success characteristics were repeatedly emphasized by the physicians. Finally, it was determined that all of the cards could be placed into one of 17 success categories. As such, none of the categories contained less than 10 cards or responses.[24] Brief verbal descriptions, based on the descriptive responses that were given by the physicians, were then formulated for each category (see Table A).

Next, the 1106 response cards were submitted to three judges for independent sortings into the 17 success categories. If at least two of the three judges agreed that a response belonged to a given category it was permanently placed in that category for the remainder of the analyses. If this two of three criterion was not met, the response was placed in the Miscellaneous category on the assumption that if a majority of the judges could not agree on its placement in a category, the response was likely either too vague to classify or was irrelevant to the established categories.

To test agreement among the three judges an overall measure of concordance across the 17 categories was computed using the *W* statistic (Kendall & Smith, 1939). The resulting coefficient of concordance was .97, a value significant at the .01 level of probability. In addition, both Pearson *r's* (Guilford, 1950) and Spearman *Rho's* (Guilford, 1950) were computed for the three possible combinations of judges' sortings. These results are presented in Table B and show that with both correlation methods the agreement between judges in their use of the categories was extremely high (the lowest obtained correlation was .95, a value significant at the .001 level of probability). In view of such high reliability the categories originally established by the authors were accepted as being distinct and descriptive characteristics of medical success.

Table B
Pearson Product-Moment Correlation Coefficients and Spearman Rank Order Correlation Coefficients Showing Agreement of 3 Judges in Their Sorting of 1106 Responses into 17 Categories

		Judges			
		1		2	
		product-moment	rank order	product-moment	rank order
Judges	1	----	----	.96*	.95*
	2	.96*	.95*	----	----
	3	.99*	.98*	.98*	.95*

*p $<$.05

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[24] The 17th category contained "Miscellaneous" responses which did not fit into any of the other 16 categories.

Table A

Characteristics Contributing to the Successful Practice of Medicine as seen by Utah Physicians

			Frequency of Response				
Title	Description	Rank	UGP *	RGP *	CS *	Total	% of total responses
Ability to establish a warm doctor-patient relationship.	Places emphasis on the personality characteristics of the physician and his ability to establish an effective system of communication with the patient. Getting along with patients, establishing rapport with them, and showing some concern for their welfare are seen as being of great importance. Also included are characteristics such as sincerity, empathy, understanding, and responsibility.	1	80	91	105	276	24.9
Miscellaneous.	Includes all responses which did not fit into any of the other 16 categories.	2	44	53	113	210	19.0
Education and training	A high quality of schooling and intern training resulting in an adequate knowledge of the medical field are seen as essential prerequisites of a competent and successful physician.	3	22	27	83	132	11.9
Honesty and integrity.	Being honest in all dealings with patients and colleagues. Also included is the ability to be honest with oneself; realizing limitations of knowledge and skill and referring patients when necessary.	4	23	21	22	66	6.0
Willingness to work hard.	A willingness to put in long, often irregular hours with patients, and taking time to do necessary laboratory chores. Physical endurance and persistence are also mentioned as valuable assets.	5	12	18	34	64	5.8
Availability.	Placing oneself at the disposal of his patients by being on call whenever needed. As a result, the patient is assured prompt service.	6	15	20	22	57	5.2
Quality of work.	Maintaining high standards of practice by being conscientious and thorough with each patient. Put briefly: doing the best job possible on each case.	7	12	17	21	50	4.5
Judgment and skill in diagnosis and treatment.	Includes all the abilities and skills the physician can bring to bear on a problem confronting him, resulting in accurate diagnosis and effective treatment.	8	8	16	24	48	4.3
Interest and satisfaction derived from medical practice.	Having a keen interest in the field of medicine and gaining a reasonable amount of personal satisfaction from one's practice.	9	10	8	30	48	4.3
Keeping abreast.	Possessing the initiative to continually read and study so as to keep informed of the new developments taking place in the medical field.	10	12	11	22	45	4.1
Getting along with, and respect of, colleagues.	Being able to establish and maintain congenial interpersonal relationships with other doctors and being recognized as competent and dependable by them.	11	1	6	16	23	2.1
Intelligence.	The ability to solve problems, learn new material quickly, and benefit from experience. Enables one to utilize training effectively.	12	4	4	10	18	1.6
Unselfish dedication to medicine.	Identified by a physician's being unselfish with his time and effort and by a sincere desire to serve others.	13	3	5	9	17	1.5
Drive for self-improvement.	A constant striving to become a better doctor by continual study and reevaluation of one's procedures.	14	3	1	12	16	1.5
Community involvment.	Gaining the respect of the community and taking part in civic activities.	15	7	1	7	15	1.4
Financial success.	Amount of money earned; attaining a relatively high standard of living.	16	3	1	7	11	1.0
Attention to detail.	The ability to deal with a large amount of necessary detail with patience and accuracy.	17	4	3	3	10	0.9

*UGP means Urban General Practitioner Sample

RGP means Rural General Practitioner Sample

CS means Certified Specialist Sample

To determine which of the 17 categories (characteristics of success) were common to each of the three groups of physicians under consideration the responses within each of the categories were first separated into their respective groups: Urban General Practitioners, Rural General Practitioners, and Certified Specialists. Then, 2x3 chi-square tables were constructed for the 17 categories. These tables were formed by dividing each group of physicians into those who mentioned a particular category and those who did not. In this manner, the relative importance that each group of physicians attached to each category was evaluated and the degree to which the three groups had a stereotyped idea of success was determined. Briefly, these chi-square tests indicated that all of the categories were given approximately the same emphasis by the three groups of physicians, with the exception of the Education and Training category and the Interest and Satisfaction Derived from Medical Practice category. Here it was found that Certified Specialists as a group tended to place more emphasis on these two categories than did Urban and Rural General Practitioners. This difference of emphasis for these two categories was significant at the .05 level of probability.

Perhaps more striking than these differences in category popularity was the finding of the high degree of regularity with which each group of physicians mentioned the same characteristics as being important to success in medical practice. In determining this two methods were used. In the first, for each group of physicians, the percentage of the total number of responses which were placed in each of the 17 categories was determined. Then, on the basis of these percentages, an "unweighted" ranking of the categories was obtained (see Table C) and Spearman Rank Order correlation coefficients were computed between the rankings of the three physician groups. As shown by Table D, the correlations were all high and significant beyond the .05 level of confidence.

Table D
Spearman Rank Correlation Coefficients Showing Magnitude of Agreement in Rank Ordering of the 17 Characteristics of Success by Each of the 3 Groups of Physicians for the Unweighted and the Weighted Rankings

		Groups of Physicians			
		Urban G. P. 's		Rural G. P. 's	
		wtd. ranking	unwtd. ranking	wtd. ranking	unwtd. ranking
Groups of Physicians	Urban G.P. 's	----	----	.90*	.89*
	Rural G.P. 's	.90*	.89*	----	----
	Special-ists	.79*	.78*	.89*	.87*

*p $<$.05

Since some physicians gave more responses than others, it was conceivable that ranking by frequency alone might not yield a true ordering of the success factors. To check this possibility, a second or "weighted" method of ranking the categories was devised. By this procedure, a ratio was first devised so that the responses of all physicians would have the same weight. Since there was a maximum of 9 responses given by one physician, a weighted score for each physician's responses was derived by dividing the number of his responses into 9. This was done on the assumption that the fewer responses a physician offered, the more importance he attached to them. After each physician's responses had been weighted in this manner, the weighted values were then inserted into each category in which a particular physician had placed a response. After tallying all 1106 of these responses into the 17 categories, the percentage of weighted responses making up each of the categories was determined. The original categories were then ranked according to these percentages thereby yielding a weighted ranking (see Table E). Computed rank order coefficients of correlation between the physician groups with this weighted ranking yielded essentially the same results as with the unweighted method (see Table D). These nearly identical values demonstrated that the rank order of the categories was very similar regardless of whether or not the difference in individual response frequency was taken into account. Thus, the field of medical practice appears to be a rather homogeneous one in the sense that, at least in the minds of physicians, the same characteristics seem to contribute to success regardless of the specific type of practice considered.

Discussion and Summary

Admittedly, the list of success characteristics found in this study is not all-inclusive nor does it offer methods by which successful doctors of the future can be chosen. It does, however, illuminate some characteristics to be considered in medical students and it establishes a framework within which these general characteristics may be broken down and more concisely defined, and hopefully it will result in the production of more efficient selection and training by supplementing those presently in use.

Our examination of the characteristics found in this study produced a number of interesting observations. The first was the overwhelming importance attributed to the personality characteristics of the physician. Approximately 25 per cent of all responses were placed in the Doctor-Patient Category. In view of this finding it is noteworthy that many medical schools evaluate applicants primarily on grades and test scores, giving personality factors a relatively minor role (Gee, & Cowles, 1957). This trend also appears in training where little or no overt attempt is made to develop those important personality characteristics needed in fostering a warm doctor-patient relationship.

Another interesting finding was the relatively greater emphasis placed on education and training by the Specialists as compared to the General Practitioners. This may be related to the extra time, effort, and expense each certified specialist invested as a necessary part of his training. For the specialist, expert knowledge in one's own field seems to become a primary goal in and of itself.

The Certified Specialists also emphasized interest in and satisfaction from work significantly more often than did the other groups of physicians. A number of hypotheses may be advance to account for this finding. It may be that the more interest a person has

Table E

Percent of Weighted Responses Placed in

Each Category by UGP, RGP, and CS

and the Resulting Rank Order

Category	UGP		RGP		CS	
	Percent	Rank	Percent	Rank	Percent	Rank
Doctor-patient relationship	31.2	1	30.7	1	21.2	2
Miscellaneous	15.8	2	19.2	2	24.1	1
Education and training	9.1	3,5	9.4	3	14.5	3
Honesty and integrity	9.1	3.5	5.8	5.5	3.5	9
Willingness to work hard	5.0	7	6.7	4	5.9	6
Availability	5.1	6	5.6	7	4.3	5
Quality of work	4.2	8	5.8	5.5	3.9	7
Judgment and skill in diagnosis and treatment	3.6	9	3.8	9	3.7	8
Interest and satisfaction derived from medical practice	3.5	10	2.0	10	5.2	5
Keeping abreast	5.3	5	5.3	8	2.8	10
Getting along with, and respect of, colleagues	0.5	16	1.6	11	2.0	11
Intelligence	1.2	13	0.9	14	1.8	13
Unselfish dedication to medicine	1.0	15	1.3	12	1.5	14
Drive for self-imporvement	0.3	17	0.0	17	1.3	15.5
Community involvement	2.3	11	0.6	15	1.3	15.5
Financial success	1.1	14	0.3	16	2.3	12
Attention to detail	1.7	12	1.0	13	0.5	17

Table C

Percent of Unweighted Responses Placed in

Each Category by UGP, RGP, and CS

and the Resulting Rank Order

Category	UGP		RGP		CS	
	Percent	Rank	Percent	Rank	Percent	Rank
Doctor-patient relationship	30.4	1	30.0	1	19.4	2
Miscellaneous	16.7	2	17.5	2	20.9	1
Education and training	8.4	4	8.9	3	15.4	3
Honesty and integrity	8.8	3	6.9	4	4.1	8
Willingness to work hard	4.6	7	5.4	4	6.3	4
Availability	5.7	5	6.7	5	4.1	8
Quality of work	4.6	7	5.7	7	3.9	10
Judgment and skill in diagnosis and treatment	3.0	10	5.4	8	4.4	6
Interest and satisfaction derived from medical practice	3.8	9	2.6	10	5.6	5
Keeping abreast	4.6	7	3.6	9	4.1	8
Getting along with, and respect of, colleagues	0.4	17	2.7	11	2.9	11
Intelligence	1.5	12.5	1.3	13	1.9	13
Unselfish dedication to medicine	1.1	15	1.7	12	1.6	14
Drive for self-improvement	1.1	15	0.3	16	2.2	12
Community involvement	2.7	11	0.3	16	1.3	15.5
Financial success	1.1	15	0.3	16	1.3	15.5
Attention to detail	1.5	12.5	0.9	14	0.6	17

in his field of endeavor, the greater is the tendency to specialize in it. Or, it could be postulated that since there seems to be a tendency in medicine towards specialization, the general practitioner feels pressure to specialize from the medical school before graduation and from specialists once he is practicing. As a result, the general practitioner may not see job interest and satisfaction as playing such an important role. Or again, it may be that the more skill a person acquires in a given area the greater his interest in his performance.

More important, however, than these differences among the three groups of physicians was the similarity of the pattern of success factors for all doctors sampled. Despite differences of training, type of practice, and area of medical interest the same characteristics were believed important in producing successful physicians. Thus, it does appear that there is a rather clear image of the "successful physician," at least in the minds of practicing physicians.

Moreover, this medical image of the successful physician is not necessarily congruent with other stereotyped notions of the successful doctor. For instance, such characteristics as an unselfish dedication to medicine, prestige in the community, and financial success, which the lay public typically associates with the profession, were ranked at the bottom of the 17 success characteristics by this study. Also, it is anticipated that the usual medical school faculty member will be disappointed to find that medical research did not receive enough emphasis to even appear on our list of success characteristics. Thus, in terms of future research in this area it is hoped that data comparable to that obtained in the present study can be gathered from medical school faculties, from paramedical personnel, and from a representative cross-section of the general public. Ideally we could hope that all of these groups would generally agree in their image of the successful physician. In any event, such studies would be valuable additions in guiding medical educators in evaluating and revising existing selection and training procedures.